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THE LONDON NATURALIST

Journal of the
LONDON NATURAL HISTORY SOCIETY

No. 88 2009

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LONDON SOCIETY

The Society welcomes new members, both beginners and experts. Its recording area (the London Area) lies within a 20-mile (32-km) radius of St Paul's Cathedral and here most of its activities take place. Although much covered with bricks and mortar, it is an exciting region with an astonishing variety of flora and fauna. The Society is open to those interested in arachnology, archaeology, botany, conchology, conservation, ecology, entomology, geology, herpetology, mammalogy, ornithology, palaeontology, rambling, and all other aspects of natural history. The Society comprises various sections, but all meetings are open to members without formality.

Publications

The London Naturalist, published annually, contains papers on the natural history and archaeology of the London Area and beyond, including records of plants and animals.

The *London Bird Report,* also published annually, contains the bird records for the London Area for each year, as well as papers on various aspects of ornithology.

Bulletins of news items, including the Society's *Newsletter* and *Ornithological Bulletin,* are sent to members throughout the year.

Indoor meetings

These are held in most weeks throughout the year, with lectures, discussions, colour slides and films on all aspects of natural history.

Field meetings

Led by experts to visit interesting localities, both within and outside our Area. These excursions are very popular with beginners wishing to increase their knowledge, and enable members to get to know one another.

Library

A large selection of books and journals on most aspects of natural history is available for loan or consultation by members free of charge.

Reading circles

Many important natural history journals are circulated by the Sections at a fraction of the cost of subscribing direct.

SUBSCRIPTIONS

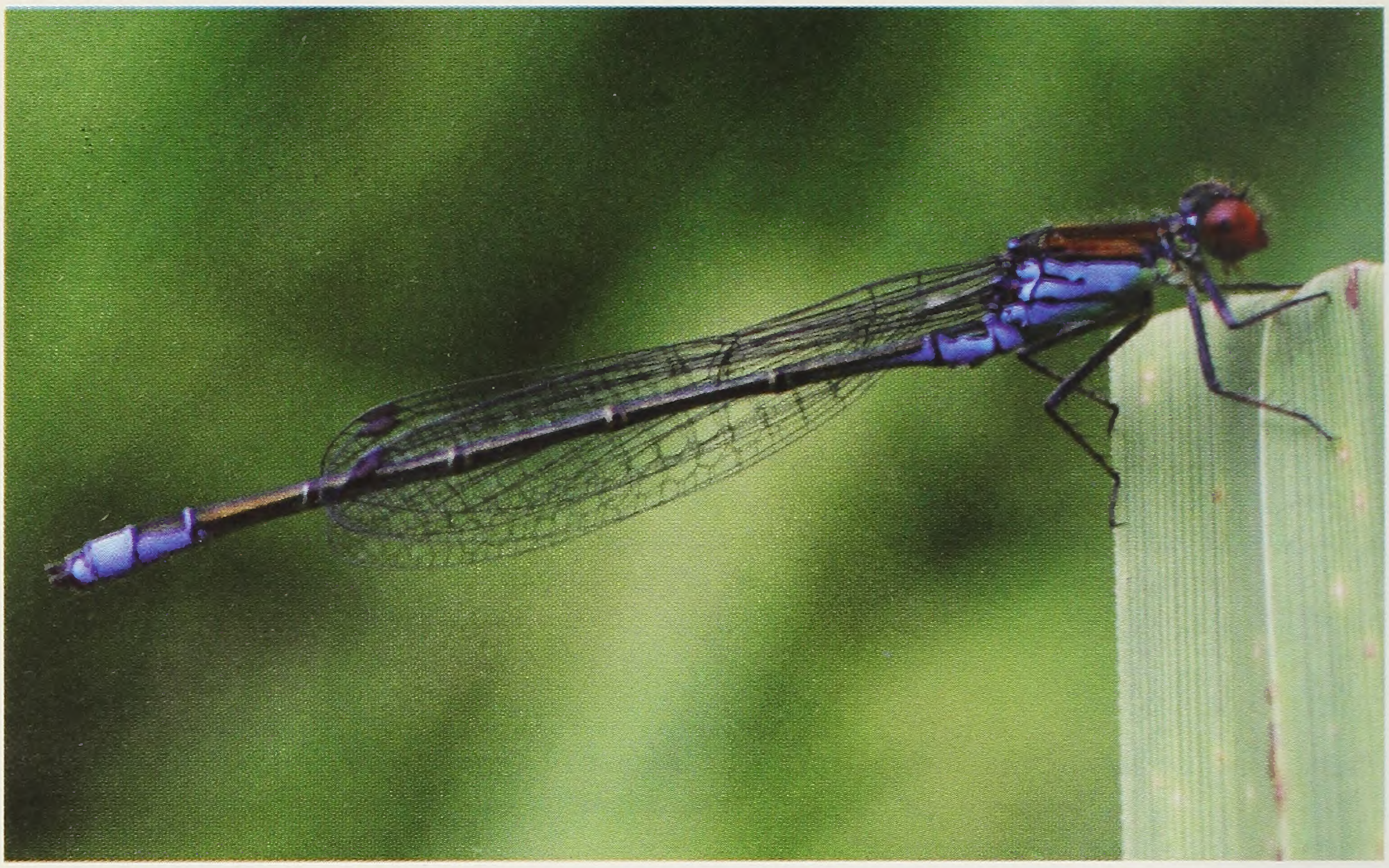
ORDINARY MEMBERS	£20.00
STUDENT MEMBERS	£5.00
SENIOR MEMBERS	£16.00
FAMILY MEMBERS	£4.00
CORPORATE SUBSCRIBERS	£20.00

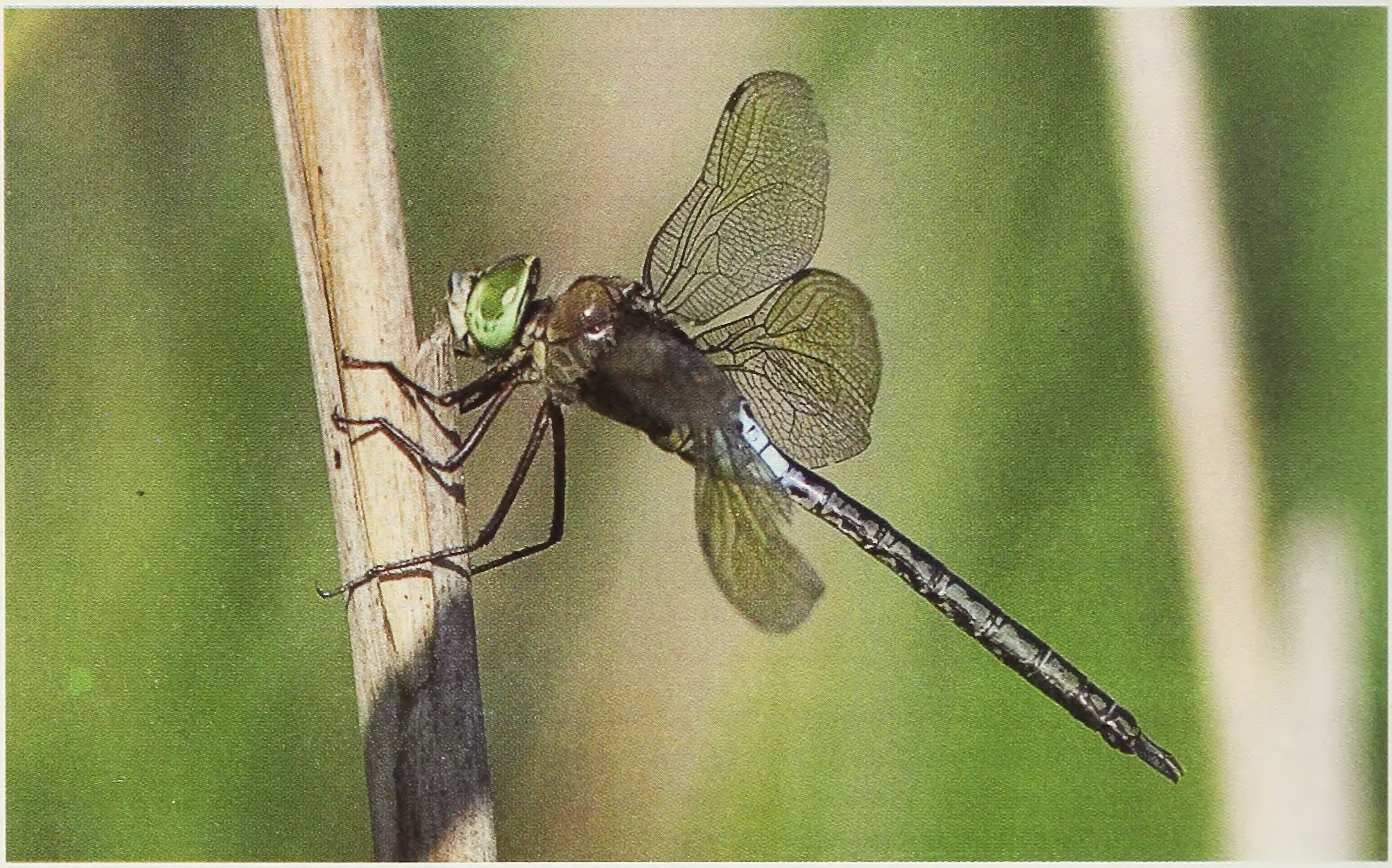
Student membership is for persons under 18 or receiving full-time education, and senior membership is for persons over 65 who have been continuous members of the Society for ten complete years. All except family members receive one free copy of *The London Naturalist* and the *London Bird Report* each year. Cheques and postal orders, payable to the London Natural History Society, should be addressed to

The Assistant Treasurer, LNHS,
Robin Blades,
32 Ashfield Road, London N14 7JY

THE LONDON NATURALIST

Further copies of this issue of *The London Naturalist* may be obtained (price £8 plus £1 postage and packing) from Catherine Schmitt, 4 Falkland Avenue, London N3 1QR. Back numbers of most recent issues of both *The London Naturalist* and *London Bird Report* are also available from the same address. Cheques should be made payable to the London Natural History Society.





Top. Male small red-eyed damselfly *Erythromma viridulum.* Since 1999, when this species was recorded for the first time in Britain, it has spread rapidly north and west from Essex. At some ponds, especially those with large amounts of hornwort *Ceratophyllum,* it is now the most abundant species. It was not a migrant before its arrival here and it appears to be responding to climate warming. It is the first recorded colonization of Britain by any species of dragonfly. *Photo: Ann Brooks*

Bottom. Male lesser emperor *Anax parthenope.* This species was recorded in Britain for the first time in 1996. Since then it has been a regular and frequent migrant in most years. Breeding has been recorded in southern England but it has yet to establish a resident population. Its habit of ovipositing with male and female in tandem is characteristic and distinguishes it from the other British hawker dragonflies. *Photo: Steve Cham*

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Journal of the
LONDON NATURAL HISTORY SOCIETY

No. 88

for the year 2008

Marking 150 years of observing and documenting London's natural history

Edited by K. H. Hyatt

Readers are respectfully advised that the publication of material in this journal does not imply that the views and opinions expressed herein are shared by the editor, the London Natural History Society, or any party other than the named author or authors.

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LONDON NATURAL HISTORY SOCIETY

Founded 1858

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92 Fellows Road, London NW3 3JG

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Editor, *Newsletter:* N. Bertrand, 21 Congers House, Bronze Street, London SE8 3DT.

Editor, *Ornithological Bulletin:* N. Tanner, 11 Collins House, Newby Place, London E14 0AX.

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The Society's Recorders

Botany

Flowering plants and vascular cryptogams: Dr M. Spencer, 72 Michael Cliffe House, Skinner Street, London EC1R 0WX (020-7837 1471).

Lichens: Ms A. J. H. Waterfield, B.SC., 29 Gloucester Crescent, London NW1 7DL (020-7267 8060).

Fungi: Prof. E. G. D. Tuddenham, 17 Bedford Road, London N22 7AU (020-8374 5167).

Bryophytes: Dr M. C. Sheahan, 61 Westmoreland Road, London SW13 9RZ (020-8748 4365).

Ecology and Entomology

Mammals: C. Herbert, 67a Ridgeway Avenue, East Barnet, Hertfordshire EN4 8TL (armconservation@hotmail.com).

Reptiles and amphibians: T. E. S. Langton, B.SC., 12 Millfield Lane, London N6 6RA (t.langt@virgin.net).

Fishes: Vacant.

Arachnida: J. E. D. Milner, B.SC., 80 Weston Park, London N8 9TB (acacia@dial.pipex.com).

Coleoptera (Carabidae and Coccinellidae): P. R. Mabbott, B.SC., 49 Endowood Road, Sheffield S7 2LY (paulmabbott@blueyonder.co.uk).

Coleoptera (Lucanidae and Buprestidae): Dr D. S. Hackett, FRES, 3 Bryanstone Road, London N8 8TN (danielhackett@blueyonder.co.uk).

Coleoptera (families not otherwise listed): M. V. L. Barclay, 47 Tynemouth Street, London SW6 2QS (m.barclay@nhm.ac.uk).

Soil-dwelling invertebrates (Myriapoda, Isopoda, Diplura): Andy Keay, 37 Merrymeet, Woodmansterne, Surrey SM7 3HX (andykeay01@aol.com).

Lepidoptera (butterflies): L. R. Williams, 34 Christchurch Avenue, Kenton, Harrow, Middlesex HA3 8NJ (leslie.williams1597@btinternet.com).

Lepidoptera (moths), Syrphidae, and invertebrates not otherwise listed: C. W. Plant, B.SC., FRES, 14 West Road, Bishops Stortford, Hertfordshire CM23 3QP (cpauk1@ntlworld.com).

Orthoptera: Sarah Barnes, 33 Tavern Close, Carshalton, Surrey SM5 1JE (lnhs.orthoptera@virginmedia.com).

Hymenoptera Aculeata: R. W. J. Uffen, 4 Mardley Avenue, Welwyn, Hertfordshire AL6 0UD (01438 714968, ruffen@talktalk.net).

Hemiptera: T. Bantock, 101 Crouch Hill, London N8 9RD (tristanba@ googlemail.com).

Odonata: Neil Anderson, B.SC., 52 Beechwood Avenue, Greenford, Middlesex UB6 9UB (neil@anders42.freeserve.co.uk).

Plant galls: K. Hill, BA, FLS, 93 Elmhurst Drive, Hornchurch, Essex RM11 1NZ.

Mollusca: Vacant.

Records may be sent to the appropriate recorder (where shown) or to Colin Plant who will distribute to each recorder the relevant data from a mixed set of records.

Geology

Vacant.

Ornithology

Inner London: R. Bonser, Flat 7, 96 Rope Street, London SE16 7TQ (richbonser8181@hotmail.com).

Hertfordshire: Joan Thompson, 73 Raglan Gardens, Watford, Hertfordshire WD19 4LJ (lnhshertsrecorder@jksthompson.plus.com).

Buckinghamshire: A. V. Moon, 46 Highfield Way, Rickmansworth, Hertfordshire WD3 2PR (andrew.moon@talk21.com).

Kent and Lower Thames (London Bridge to Tilbury): J. Archer, 8 Smead Way, London SE13 7GE (john_archer@gofast.co.uk).

Surrey and Upper Thames (London Bridge to Staines): S. Spooner, 32 Berkeley Drive, West Molesey, Surrey KT8 1RA (sjspooner@ntlworld.com).

Middlesex: M. Pearson, 48a Stamford Hill, London N16 6XT (middxrecorder@googlemail.com).

Essex: R. Woodward, 62c High Street, Cheshunt, Hertfordshire EN8 0AH (roy.rkwoodward@ntlworld.com).

Requests for information should be made to the appropriate recorder.

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Report of the Society for the year ending 30 June 2008

Approved at the Annual General Meeting on 9 December 2008

History and objectives of the Society

The Society traces its origins to the Haggerstone Entomological Society, founded in 1858. Following mergers with cognate societies, members' interests widened to embrace the study and recording of all aspects of natural history, especially within twenty miles of St Paul's Cathedral. The objects of the Society, last amended in 2005, include also the promotion of scientific investigations, the appreciation and conservation of the natural environment and the publication in the Society's journals of scientific and educational papers.

With habitats changing fast, and introduced species appearing even faster, recording the animals and plants present in the London area must remain a primary objective. As interest in the environment and biodiversity has grown, other organizations have come to rely on the substantial stock of data held by the Society's recorders, and their expert understanding of the taxa concerned. A revised Records Policy which came into force in 2007 encourages recorders to make their records available, free of charge but with appropriate safeguards where necessary, to the regional biological records centre, Greenspace Information for Greater London (GiGL). These data are the primary source of records in the London area for many national recording schemes, many of which are now linked to the National Biodiversity Network.

A number of public events, mentioned briefly in the previous Annual Report, have taken place to celebrate the Society's 150th anniversary. Those which fell in the current year included three guided walks — through Haggerston, and in the City of London, for general natural history, and in St James's Park for birdwatching — in June 2008. The anniversary Conference in October, and a commemorative publication, will be noted in next year's Report.

Council, Committees and Sections

Four trustees (Rodney Burton, David Darrell-Lambert, Mick Massie and Pat Sellar) resigned from Council at the end of 2007. Trustees elected at the AGM included three newcomers (David Allen, Marc Carlton and Dave Dawson) as well as returning and re-elected members including the treasurer and secretary. Trustees representing each of the five Sections were elected to Council at sectional AGMs. As the Society's revised Rules came into force in December 2005, Rule 4(c), limiting a continuous period of elected membership to five years, will first be implemented at the AGM in 2010. Following his election our incoming president, Mark Burgess, gave his address which appeared in *The London Naturalist,* **87**.

Besides appointing members of the three standing Committees (Administration and Finance Committee, Library Committee, *London Naturalist* Committee) Council established two Working Groups — the 150th Anniversary Group, charged with organizing the special events in 2008, and the Publicity Working Group. The latter arose from the view of trustees that, as a membership organization, the Society should make further attempts to reach new audiences in pursuit of its charitable objectives. The Working Group is convened by Jan Hewlett and its recommendations will inform Council's response to the Charity Commission's guidance notes on public benefit, expected by the end of 2008.

During the year David Darrell-Lambert resigned as chairman of Ornithology Section and was replaced by David Lindo, who also joined Council as representative of the Section. His experience of outreach and public involvement in natural history will be a great asset. David Bevan, chairman of Botany Section, continues to serve on the Management Board of the London Biodiversity Partnership while John Swindells represents the Society on the GiGL Steering Group. Rodney Burton resigned as recorder of vascular plants and was replaced by Mark Spencer, Curator of the British and Sloane Herbarium at the Natural History Museum. Rodney became recorder in 1975, on the death of Ted Lousley, recorder since 1943; we welcome Mark to the ranks of hardy perennials. Ruth Kirk resigned as fish recorder but has not yet been replaced.

Membership and communication

The number of individual members currently stands at 968, compared with 942 at the same time last year: 104 new members joined during the year, up from 66 last year. These, if not statistical blips, are encouraging figures following several years of decline and, together with an increase in Gift Aid, account for the 4 per cent rise in subscription income.

We record with regret the deaths of the following members (date of joining in brackets): Donald Evemy (1977), Dr Diana Griffith (1981), Richard Gutteridge (1956), Mrs Norah Landells (1946), Dr Ian Menzies (1989), Arthur Myers (1938), Mrs Elizabeth Norman (1961), Miss Barbara Pearce (1974), Mrs Christine Winterman (1988) and Miss Jane Woodliff (1992).

Most new members are now recruited through the website and we are indebted to Marc Carlton who as web manager has transformed its appearance and usefulness. The members-only website http://tech.groups.yahoo.com/group/LNHS-members now has well over a hundred participants but this is only a small fraction of our membership; it is a good way, especially for those who are unable to attend field meetings or indoor lectures, to contact like-minded naturalists. An analysis by Robin Blades, assistant treasurer, of new members' interests shows an emphasis on ecology, conservation and general natural history for which the present sectional structure may not cater adequately. Council will consider the implications of this in due course.

For many members, the *Newsletter* is their main contact with the Society. Mindful of this, more colour pages have been introduced. Council also approved expenditure on new publicity material, and for consultancy on outreach and public engagement, following recommendations of the Publicity Working Group. These included a proposal for a press officer, a post which Emma Hinton agreed to fill initially, in addition to her editorship of the *Newsletter*. All Society officers and appointments are unpaid and Council is most grateful to those members who volunteer to fill them.

The Society's stand at the Lee Valley Spring Wildlife Fair was a great success, attracting much interest and many new members. We congratulate those who staffed it, including Angela Linnell, Mike Trier and Emma herself.

Publications and journals

The London Naturalist **86** for 2007 was published in December, and *London Bird Report* **69** for 2004 in April. Council continued to express concern over the backlog of *LBR*s, and a Special Meeting of Council was requested and convened to discuss the matter. Whilst acknowledging the problems caused by a great increase in the number of records to be processed, Council resolved that the editor be mandated to produce *London Bird Reports* for both 2005 and 2006 by April 2009; and asked the Committee of Ornithology Section to consult widely and advise Council whether to continue to publish *London Bird Report*, in its present format or otherwise, subsequently. A further request was that progress against a publication schedule be reported to every meeting of Council.

Though it falls outside the period of this report, it should be mentioned that the Ornithology Committee and the editor of *LBR*, Andrew Self, have since had constructive meetings, one result of which is the survey of members' opinions on the future of the *London Bird Report* and *Ornithological Bulletin*, announced in the August *Newsletter*. It is to be hoped that the outcome will be acceptable both to members and to the wider ornithological community.

Discussions within the Botany Committee have continued over the best way to publish a comprehensive flora of Hampstead Heath, following a detailed survey by members between 1997 and 2003. Meanwhile, the raw data are summarized on a CD of a *Millennial Checklist of the Flowering Plants and Ferns of Hampstead Heath*, available from Sheila Ayres for £2.50 — details are in the *Newsletter* of April 2008.

The Society's library remains in storage at the Natural History Museum. It is expected that the majority of the stock, relating particularly to the British flora and fauna, will be incorporated within the UK Biodiversity Centre in Phase 2 of the NHM's Darwin Centre which is to open in 2009. The Society will retain ownership, and the public as well as members of the Society will benefit from this resource, but detailed arrangements are yet to be agreed.

Grants in support of the Society's objectives

Few grants have been made in recent years. Council wishes to support projects within the scope of its charitable objectives, and has reviewed the areas which are most likely to attract worthwhile and affordable applications. Discussions are currently in progress with other grant-giving bodies to ensure some degree of cooperation in soliciting applications, and to avoid overlap where possible.

One grant was made this year, to the Hertfordshire Natural History Society to assist publication of *The Moths of Hertfordshire* by Colin Plant. This monograph by an eminent entomologist, and vice-president and former president of the LNHS, deals with a county of which one third lies within the Society's recording area.

Conservation and protection of the environment

Agreement by the Thurrock Development Corporation to an application to build on an entomologically rich site at West Thurrock Marshes was strongly opposed by many organizations including the Society. An appeal against this decision was unsuccessful, but though the prospective developer subsequently withdrew the application, it may reapply.

This episode was one of several in which the Society has been asked to help oppose developments that threaten London's wildlife and its habitats. While accepting that the term 'natural environment' has little or no meaning in London, Council is disposed to support such campaigns where they are clearly aligned with the Society's objectives, and intends to draw up guidelines to assist our conservation officer, David Bevan.

The most pressing of these developments is the 2012 Olympics which will have a disproportionate effect on certain London boroughs. Council invited Paul Robinson of the Hackney Wildlife Group to speak on this. Council agreed to receive the Group's records, to set up a link to its website, and to consider suggestions for joint field meetings.

Members' activities

Once again the hundred or so field meetings — about half arranged by the Ornithology Section, the rest equally divided between Botany, and Ecology & Entomology — were well attended. Details appear in the sectional reports. Although, inevitably, each Section has its 'hard core' of regular attendees, there are as usual a gratifying number of newcomers to the Society, and others attending once or twice before deciding whether to join. Leaders of meetings do their best to make beginners and novices welcome, and feedback to Council suggests that they succeed more often than not.

Besides the anniversary guided walks, mentioned earlier, and the regular programme of indoor meetings (some now held at London Wildlife Trust's Camley Street Natural Park) the second of the annual lectures held jointly with the London and Middlesex Archaeological Society took place, at which Todd Langstaffe-Gowan described in vivid detail the restoration and replanting of the gardens at Hampton Court Palace.

This report has been prepared in accordance with the Charity Commission's Statement of Recommended Practice (SORP 2005) for Trustees' Annual Reports.

Treasurer's report for 2007/2008

At the end of the financial year on 30 June 2008, the total net assets of the Society were £339,334 compared with £332,663 the previous year.

The accounts for the year show a surplus of £6,671 compared with a loss of £14,353 in 2006/2007. Income for the year totalled £40,670, compared with £37,253 in the previous year. Subscription income (including Gift Aid tax recovered) increased from £19,639 in the previous year to £20,445 in 2007/2008. Sales of the Society's various publications generated £912, compared with £909 in the previous year. The Society's investment in the COIF Charities Deposit Fund generated interest of £18,094 (2006/2007: £15,706) at an average rate of just over 5.6 per cent (2006/2007: 4.9 per cent).

Overall expenditure during the year was £33,999 compared with £51,606 in the previous year when there were one-off costs associated with the removal of the Society's library from Imperial College, and writing of *London Bird Report* 2002–2003 in an attempt to reduce the backlog in production of this journal.

Reserves policy

The Society's unrestricted general funds can be regarded as expendable endowment since they are invested to provide a regular source of income as well as capital growth, over time.

Statement of trustees' responsibilities

Law applicable to charities in England and Wales requires the trustees to prepare financial statements for each financial year which give a true and fair view of the charity's financial activities during the year and of its financial position at the end of the year. In preparing those financial statements the trustees are required:

- to select suitable accounting policies and then apply them consistently;
- to make judgements and estimates that are reasonable and prudent;
- to state whether applicable accounting standards and statements of recommended practice have been followed subject to any departures disclosed and explained in the financial statements; and
- to prepare the financial statements on the going concern basis unless it is inappropriate to presume that the charity will continue to operate.

The trustees are responsible for keeping accounting records which disclose with reasonable accuracy at any time the financial position of the charity and enable them to ensure that the financial statements comply with the Charities Act 1993. They are also responsible for safeguarding the assets of the charity and hence for taking reasonable steps for the prevention and detection of fraud or other irregularities.

Summarized accounts for the year ended 30 June 2008

These summarized accounts have been extracted from the Society's annual accounts for 2007/2008. They may not contain sufficient information to provide a full understanding of the financial affairs of the Society. For further information on the full accounts, the Independent Examination report on these accounts and the trustees' annual report should be consulted. Copies can be obtained from the Hon. Treasurer, M. J. West, 52 Trinity Road, Ware, Hertfordshire SG12 7DD.

The full annual accounts were approved by the trustees on 8 October 2008.

Summarized statement of financial activities for the year ended 30 June 2008

	Unrestricted general funds	
	2008	2007
	£	£
Incoming resources		
Incoming resources from generated funds:		
Voluntary income:		
Subscriptions received from members	20,445	19,639
Donations and other income	562	526
Investment income:		
Interest receivable	18,751	16,179
Incoming resources from charitable activities:		
Publications/journals income	912	909
Total incoming resources	40,670	37,253
Resources expended:		
Charitable activities	28,520	46,131
Governance costs	5,479	5,475
Total resources expended	33,999	51,606
Net movement in funds	6,671	(14,353)
Fund balance brought forward at 1 July	332,663	347,016
Fund balance carried forward at 30 June	£339,334	£332,663

Balance sheet as at 30 June 2008

	2008	2007
	£	£
Fixed assets		
Tangible fixed assets	325	1,633
Net current assets (including cash deposits)	339,009	331,030
Total net assets	£339,334	£332,663

Official and sectional reports for 2008

CONSERVATION

The Society continues to play an active role within the London Biodiversity Partnership (LBP). The Conservation Officer represents the Society on the Partnership Board, and Mick Massie is an active member of the Habitat, Species and Data group, which coordinates the development of habitat and species action plans (HAPs and SAPs). On 1 April 2008, Natural England took over hosting the Partnership from the London Wildlife Trust — bringing the London region into line with all eight other England regions. At this time, Andrew Jones (GLA Biodiversity, Noise and Waste Manager) took over as the newly elected LBP chair. In June 2008, Dr Amanda Maclean was appointed as a new part-time Local Biodiversity Action Plan officer to assist London boroughs with developing their LBAPs. Two contrasting new organizations joined the Partnership during the year: the Campaign to Protect Rural England, and the London Fire and Emergency Planning Authority. Contact details for these and the thirty other Partners can be found on the LBP website — www.lbp.org.uk

From the early part of the year, the Board decided that attention should be focused on the delivery of habitat action plans for a limited range of priority habitats. Six habitats were chosen: Acid Grassland, Chalk Grassland, Heathland, Rivers and Streams, Standing Water, and Woodland. To facilitate this work, the lead organizations for all these priority habitats were invited to join the LBP Board, if they were not already represented. Thus Froglife (now Amphibian and Reptile Conservation) joined the Board to take forward the Standing Water HAP, the London Borough of Bromley joined to facilitate the Chalk Grassland HAP, and the Royal Parks Authority joined to take forward the Acid Grassland HAP. These three organizations joined as temporary members of the Board. They will remain on the Board until different habitats may be chosen as priorities by the Partnership. Any such changes will be discussed and agreed at an Annual Forum. The first of these was held on 15 January 2009, ably chaired by Andrew Jones and LNHS Ornithology chairman David Lindo. The meeting confirmed that the six HAPs listed above would continue as priorities in 2009.

On 17 April 2008, at a meeting organized jointly by The Linnean Society of London and the LNHS (one of a number of events marking the 150th anniversary of the LNHS), the Conservation Officer spoke at Burlington House on ‘Conserving Nature in London’.

On 21 June, the third Wildlife Gardening Day was held at London Zoo. This was organized by the London Gardens for Wildlife Group (the lead for the Private Gardens HAP), and sponsored by Natural England. The event was in two parts — a Wildlife Gardening Conference of talks and workshops at the Zoological Society of London Conference Centre, and a Wildlife Gardening Fayre held in Regent’s Park just across the road from the Zoo. The LNHS were involved in both parts of the Day, running a popular stall at the Fayre, and presenting a workshop (Gardening with Wild Flowers) at the Conference. The two key-note speakers were Chris Baines (author of the classic *How to make a wildlife garden*), and Ken Thompson (one of the leading researchers on wildlife gardening, and author of *No nettles required: the reassuring truth about wildlife gardening*). Their very different presentations were both well received, and, despite dreadful weather, the workshops were well attended and received positive feedback.

It was the final year of the Capital Woodlands Project, which aimed to raise appreciation of London’s woodlands and increase public benefit and participation by undertaking access, biodiversity, community and training work both in six ‘flagship’ woodlands and throughout the capital. This has involved a great deal of work over the last three years in woodlands throughout London. For example, in Coldfall Wood in Haringey, one of the six flagship woods, two local schools have become involved with management work under the guidance of the Conservation Officer and the borough's Parks Service. An extensive area beside the stream, coppiced in November 2006, has continued to produce new botanical records including a number of London rarities including pill sedge *Carex pilulifera*, and square-stalked St John's-wort *Hypericum tetrapterum*. The successful completion of the Capital Woodlands Project was celebrated on 1 December with a conference at City Hall: 'Making London's Woodlands Work'.

DAVID BEVAN, *Conservation Officer*

BOTANY

The Botany Section has had another eventful year. At the AGM in October 2008, Nick Bertrand graphically described the loss of valuable wasteland sites in his talk entitled 'Wasted Land: habitat loss in Inner London from the mid-1980s to the present day'. Focusing on south-east London, he noted contradictory trends in the last twenty years: celebrating 'wildlife' on the one hand, while providing poor site management (or no management) on the other. In contrast to the detailed recording of species on bomb-sites after World War 2, by the 1970s and 1980s former industrial sites such as decommissioned gasworks and abandoned railway land had received little attention. Yet many of these places, often originating in the countryside, had become important refugia for species in built-up areas. Frequently contaminated, such sites could support a remarkably diverse flora containing a fascinating mixture of calcicoles and calcifuges.

Ecology had become 'professionalized', but ecologists had not been effective at either promoting or protecting these important sites. As a result much had been lost. Nick showed photographs of some of the places that had been destroyed. They included the Bricklayers Arms sidings (east of Elephant and Castle), Erith Marshes, Crossness, and the late-lamented William Curtis Ecological Park, created in the 1970s opposite the Tower of London (and shown on the front cover of the Society's *Flora of the London Area* published in 1983). This last site, with its groundbreaking habitat creation, also supported a characteristic and rich London wasteland flora. It was bulldozed and left for fifteen years before central government offered it as a site for the new City Hall. Nick concluded that the loss of these habitats and their associated flora and fauna could have been minimized by good management. Similar opportunities are unlikely to occur again in central London.

Two informal indoor meetings were held early in the year. The first was our annual gathering at which members are encouraged to show their 'best botanical photographs' from the previous year. Later, there was a talk by Rodney Burton intriguingly titled 'What should we do about London's rare plants?' Rodney has been working on a 'rare plants register' for London, and his talk included a discussion about this project and an update on its progress.

Our field meetings secretary, George Hounsome organized another full programme of visits. After the lower attendances at outdoor meetings in 2007, mainly due to poor weather during the summer, average numbers picked up again this year. There were winter visits to Oxleas Wood and Puttenham Common, and in the spring, outings to Bookham Common for lichens, and to Trent Park. A successful spring fungus foray at Hyde Park was followed by visits to Ranmore Common and Abney Park Cemetery (to learn about its trees and their diseases).

In early summer there was a focus on plants of aquatic habitats — with a low-tide creek walk near Greenwich and visits to Benfleet Marshes and Ham River Lands. John Swindells provided his annual 'pot luck in the East End' meeting and there were excursions to Wisley Common and nearby sites. In July we visited Farthing Down and the Happy Valley in Surrey for an introduction to its chalk grassland flora, and we explored the newly coppiced areas of Coldfall Wood in Haringey. There was a visit to the Blackwater Valley for its rich riparian and aquatic flora, and Dr Tom Cope explained the intricacies of grass identification in Richmond Park. In August, by way of preparation for forthcoming fieldwork for the proposed new *Flora* of Greater London, Mark Spencer led a meeting to record the plants in a selected one-kilometre square in central London. Later in the month, Nick Bertrand introduced us to the wild plants of the Surrey Docks. In September there were visits to Denham Country Park and Colne Valley, and in early October, to Lesnes Abbey Wood for lichens and bryophytes.

The Botany Section played its part in the celebrations for the 150th anniversary of the Society. In April, David Bevan addressed a joint meeting of the Linnean Society of London and the LNHS on ‘Nature Conservation in London’. In June, John Swindells led a walk from Haggerston to the City to celebrate the 150th anniversary of the first meeting of the Haggerstone Entomological Society in 1858. At the anniversary conference ‘London’s Natural History — Past, Present and Future’, held at the Linnean Society on 11 October, Mark Spencer spoke on ‘Whither London’s flora?’. The conference was organized by the LNHS in association with the Linnean Society and the Society for the History of Natural History.

Mark Spencer and the LNHS Botany Committee have decided that the time has now come to start planning for a new *Flora* of London to bring up to date Rodney Burton’s *Flora of the London Area*. Since its publication in 1983, the plant life of Greater London and the surrounding region has undergone massive changes. The abundance of many non-native plants has increased, whereas many of our rarer native species continue to decline or have become extinct. Mark stated that the areas outside the current boundaries of Greater London are generally well served by floras that are either in production or have been produced relatively recently. Additionally, the rate and form of change in those areas appears to have been rather different to that currently taking place in central London. The Botany Committee shares these views. Mark therefore suggested that the proposed new *Flora* should be restricted to the Greater London area and to the small part of the vice-county of Middlesex that falls outside the GLA boundary. Over the next year or two ideas will be developed on how to proceed with this project. Please contact Mark (72 Michael Cliffe House, Skinner Street, London, EC1R 0WX; Tel.: [+44] 020 7837 1471; E-mail: Lnhs_plant_recorder@hotmail.co.uk) if you would like to participate.

Despite ill health in the early part of the year, Mark has transferred into Mapmate around 7,000 botanical records submitted to him during 2007 and 2008. These will soon be deposited with GiGL and the BSBI. He has also led two introductory training days for beginners this summer: the first was at Camley Street (concentrating on grasses, sedges and rushes); and the second was at the Creekside Centre in Deptford (looking at *Conyza* and *Sisymbrium* and other widespread urban plants).

Mary Clare Sheahan reports on a bryophyte meeting on Hampstead Heath on 30 March — one of the regular meetings of the Hampstead group. Together with Jeff Duckett, who has made a special study of the bryophytes of the Heath, they found the tiny *Gymnostomum viridulum*, and a good patch of *Hennediella macrophylla*, with sporophytes present. This is a recent arrival in the UK, appearing in a few sites in London. There was also a visit to Lesnes Abbey Wood and Heath at the beginning of October, to show beginners both lichens and bryophytes. Mary Clare hopes that some of the participants may be inspired to take their interest further and send in records from places they have visited. In addition several recording visits were made this year, for example to Bushy Park, Brompton Cemetery and Ruislip Woods. Data entry is continuing, but Mary Clare may have to wait until she is fully retired before she is able to catch up with this work.

Amanda Waterfield reports that due to a combination of ill health and poor weather, she was not able do as much recording as she had hoped. However, it was good to see fruticose lichens at Greenwich, which compared favourably with the scarcity of lichens at Lesnes Abbey Wood. She is working on a checklist of the lichens of the LNHS area that she hopes can be put on the website when it is finished.

Ted Tuddenham reported a highly successful first foray of the year to Kensington Gardens and Hyde Park on Sunday 27 April. About twenty forayers attended and over twenty species were recorded. The target species, St George mushroom *Calocybe gambosa* was found in abundance. The exceptionally wet July and August brought out an abundance of fungi that were individually reported to the recorder and entered in the records. In the first autumn foray on 26 October to Trent Park, fifteen keen forayers braved the inclement weather to see over a hundred species including *Amanita excelsa* var. *spissa* (new to the site) and a newly recognized taxon *Chloromyces olivieri*, also new to the site and to Middlesex. The traditional Haringey Fungus Foray was as well attended as ever, with around fifty participants. Although the range of species in the woodland habitats was a little down on previous years, we were pleased to discover a fine specimen of the cauliflower fungus *Sparassis crispa* in Tottenham Cemetery. The final feast at Railway Fields included several penny buns *Boletus edulis.*

On 25 October, Ted gave a talk on alien fungi at the BSBI seminar on ‘Understanding our Alien Flora’, which was well received.

Ted has switched to depositing records with the new CATE system (Creating a Taxonomic e-Science) used by the Association of British Fungus Groups. This provides access on line with easy rapid searching under a range of search queries.

David Bevan, *Chairman,* Sarah Graham-Brown, *Secretary*

ECOLOGY AND ENTOMOLOGY

The Section has had another successful year with indoor meetings, field trips and the invaluable recording activities of our recorders of taxa from mammals to dragonflies.

Over the year our indoor meetings secretary, Claudia Watts has arranged for speakers on a variety of topics of interest to members in general as well as to amateur entomologists. In February, Mick Massie gave a demonstration on ‘Getting started with wildlife digital photography’, a practical demonstration of equipment, techniques and methods of filing images. In March, Roger Morris of Dipterists Forum spoke on ‘Hoverflies: the Hoverfly Recording Scheme’, which demonstrated the changes in hoverfly distribution over the past five decades which indicate climate change. Dr Chris Gleed-Owen of Herpetological Conservation Trust was our speaker in April who explained the National Amphibian and Reptiles Recording Scheme (NARRS) and gave some hints on identification and how to find the various species. Marc Carlton’s talk in June on ‘Bumblebees for beginners’ attracted a large audience — botanists frequently observe bees. This talk was followed up by a field trip to Farthing Down which was also well attended.

At our annual joint meeting with British Entomological and Natural History Society in September, Richard Jones gave the Brad Ashby Lecture entitled ‘How to be a (curious) coleopterist’, amusingly describing his adventures over a lifetime as a professional naturalist. Most members use public transport so the talk by Marian Kelley of London Underground in October on ‘The wildlife of the London Tube Network’ drew a large audience. In recent years London

Underground has given a higher priority to maintaining and enriching the various habitats on the 4,000 acres of land in their possession, as do their two main contractors. At our AGM in November reports received from recorders led to lively discussions on introductions of alien species and on the network of organizations receiving the same records with the possibility of duplication and confusion.

Mick Massie, field meetings secretary, organized twenty-one field trips during the year including some held jointly with other societies such as Butterfly Conservation. During National Insect Week at the end of June a joint trip to the Isle of Sheppey was held with Kent Field Club and the Royal Entomological Society. At the conclusion of our AGM, Mick showed a selection of images from various field trips.

During 2008 the Society has been celebrating its 150th anniversary and our Coleoptera recorder Max Barclay contributed a paper, 'London's bugs and beetles', to our celebratory conference in October.

Once again the Section represented the Society at the Amateur Entomologists' Society Exhibition, selling books and journals as well as making the work of the Society known to a wider public.

COLIN BOWLT, *Chairman*, CATHERINE SCHMITT, *Secretary*

ORNITHOLOGY

The Ornithology Section had a successful year. There were trips to the amazingly diverse sites all round London almost every weekend and coach outings to places in the south-east famous for their birds. The indoor meetings were well attended, especially those given by David Darrell-Lambert. The number of members recruited at the Lee Valley Spring Wildlife Weekend in 2008 was a record.

Our vice-chairman, Pete Lambert, organized forty-eight walks involving twenty-five different leaders and would like to take this opportunity to thank all those leaders for giving up their time to do this. For those hoping to find birds not often seen in London, the highlights would probably be the following. At Wat Tyler Country Park in January, we saw white-fronted geese, barn owl and calling bearded tit; a great white egret at one of the visits to Beddington (as well as their usual tree sparrows); smew and bittern at Amwell; merlin, water pipit and rock pipit, as well as more white-fronted geese at Rainham; the only lesser spotted woodpecker seen on our walks, at Trent Park; redstart at Fairlop in April; marsh tit at Selsdon Woods in June; marsh harrier, spotted flycatcher and tree pipit on another Rainham trip in August; thirty-four black terns on the Thames at Tilbury in September. We also saw another spotted flycatcher at Bushy Park, and on a trip to Cheshunt we saw five buzzards soaring together.

Apart from finding these rare or scarce birds, the trips also covered the basic methods of finding and identifying the commoner birds. Opportunities were offered in identifying migrant fieldfares, redwings, siskins and redpolls by their calls at walks in autumn and winter; identification of ducks at walks from November to February; April and May trips to learn the songs of warblers and see spring passage; learning how to identify raptors soaring overhead; how to find birds like bullfinch and treecreeper from their calls. And, on all trips, what to see and where to go at each site.

Neil Anderson, our coach trip organizer, reports on the 2008 outings. The first trip of the year was to Holkham in mid January. The park produced a flock of about 250 redwings and, very pleasingly, about fifty bramblings. The bay had a fluttering flock of about twenty snow buntings while amongst the flocks of pinkfeet was a single Ross's goose. The weather for the April trip to Fingringhoe Wick was not particularly spring like, although nightingale was heard. Highlights were long-tailed duck and a Slavonian grebe. The weather was far better the following month for a trip to Stodmarsh where turtle doves purred for us and nightingales sang, and we saw six species of raptor including buzzard, two red kites and many hobbies. In mid August Pagham Harbour was visited where, in addition to a variety of waders and numerous little egrets, we also saw Arctic terns amongst the many loafing sandwich terns and an Arctic skua chasing the terns within the harbour. Rutland Water was our destination at the end of November where, despite the mist, we managed four species of grebe including black-necked and Slavonian. Good numbers of bullfinches were noted and tree sparrows were present at the feeders. It was generally a good season, though the proposed September trip to Snettisham had to be cancelled due to low demand. Neil is disappointed that it always seems to be a struggle to fill coach outings in September, despite it being an excellent month and that the autumn migration is in full swing.

Andrew Self reported that the Records Committee had undergone a substantial change of personnel in 2008. New recorders had been appointed for Essex, Hertfordshire, Kent and Middlesex. It was also decided to divide the duties of the Records Committee into two new committees — a Rarities Committee chaired by Bob Watts consisting of just four recorders, in addition to the chairman. The Records Committee's task is to decide which species require descriptions or notes and to accept or reject all records for those species. A full list is then prepared for the editor of the *London Bird Report*. Over 200 records for 2005 were considered this year.

The other new committee is the Recorders' Committee, which is chaired by Andrew Self. This committee consists of all the sector bird recorders with the chairman being the overall London Bird Recorder. The recorders are responsible for producing a spreadsheet of all records for their sector each year which are then compiled by the database manager and passed to the editor of the *London Bird Report*. In the twelve-month period from July 2007–June 2008 the database for 2005 was completed and the *London Bird Report* was published at Christmas 2008. Work was almost completed on the 2006 database by the end of 2008. Considerable progress had been made in monitoring the production of the *London Bird Report* and it was hoped that the 2006 and 2007 reports would be published in 2009.

The indoor meetings were held both at the Crestfield Street Methodist Church, opposite King's Cross Station, and at Camley Street Natural Park, behind St Pancras Station. The latter venue has been offered to us free of charge by Camley Street. There were well-attended talks by David Darrell-Lambert on 'Improving Bird Skills' and on 'Birds of the Tidal Thames', a controversial discussion on 'Are Garden Birdwatchers Real Birdwatchers?' from Paul Stancliffe, and another on controversial birds, 'Parakeets for Beginners'. At our AGM we had a talk from our new chairman, David Lindo, on 'The Day I fell in Love'. The LNHS is no longer able to hold talks at Crestfield Street as the church now holds its own meetings every night of the week so a change of venue was necessary.

The Lee Valley Spring Wildlife Weekend was held at the end of April and Mike Trier organized the LNHS stand. It was at a new venue on the main road, rather than being somewhere off the beaten track, and was free to the public for the first time. We recruited sixteen new members, the highest number we have had from one of these events.

The Committee always welcomes suggestions for indoor and outdoor meetings or any way we can improve what we offer to members. Do please contact us if you have any ideas.

DAVID LINDO, *Chairman* (the urbanbirder@theurbanbirder.com),

ANGELA LINNELL, *Committee Secretary*
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London's Natural History — past, present and future

A conference to celebrate the 150th anniversary of the founding of the Haggerston Entomological Society, forerunner of the London Natural History Society

**Organized by the London Natural History in association with
The Linnean Society of London and the Society for the History of
Natural History, and held at The Linnean Society,
Burlington House, Piccadilly, on 11 October 2008**

Opening of the Conference

HELEN PHILLIPS
Chief Executive, Natural England

I am delighted to be here today to celebrate the 150th anniversary of the London Natural History Society. It is a commendable achievement to maintain the levels of professionalism, dedication and enthusiasm for a century and a half. The people of London, and its wildlife, should be tremendously grateful. At Natural England we have just reached the two-year milestone — you have set quite a target for us. Today we live in changing times — the world of finance is in turmoil; the transition towards a low-carbon economy is the subject of mainstream debate, not environmental fantasy, and the natural environment faces increasing pressure both from development and from climate change.

The Society was formed, it seems to me, in even more turbulent times: 1858 was the year that Darwin and Wallace published their paper *On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection* that in many ways changed the world, confronting dogma with science. And London was creaking under the weight of its own sewage and riven by cholera, and numbers of other infectious diseases. This was the London described just five years earlier in Dickens's *Bleak House*. A London where over two and half million people lived in 'tumbling tenements. By night, a swarm of misery'. I suspect that wildlife conservation didn't figure highly on the list of priorities for many — save perhaps avoiding the 'vermin and maggots . . . fetching and carrying fever, and sowing more evil'.

The hot summer — remember those — of 1858 was particularly eventful. London was gripped by the Great Stink, created by 2.5 million chamber pots and factory effluents poured directly into the river. Disraeli described the Thames as 'a Stygian pool reeking with ineffable and unbearable horror'. The river had been black throughout the 1850s, with people dying in large numbers of a variety of diseases. But it was the direct assault on the olfactory senses of the honourable Members of Parliment that sprung law makers into action in the summer of 1858. Just sixteen days later a Bill was passed authorizing the construction of London's sewerage network, with a price tag of £3 million pounds — a staggering figure then.

I mention this because it illustrates two points. The first is how ahead of times the founder members of the Society must have been — to be, I imagine, working at a time when Darwin and Wallace's theory was considered by many to be heresy; and when concern for the natural environment was considered an extravagance by the vast majority. And the second point to note is that action is too often only taken when disaster strikes. In 1848 the British government passed the Public Health Act after 14,000 people died from cholera in London. In 1858 the Great Stink led to the construction of the sewerage system. The Great Smog of 1952 led to the Clean Air Act.

In 2008 the future of our natural environment is in the balance — only last week the IUCN released its latest red list with disturbing figures about the plight of the world's mammals. Our job then, as naturalists, environmentalists, conservationists — it doesn't matter which label you use, we all care passionately about the fate of the natural world — is to make the case for the natural environment so that action is taken now, not when it is too late.

London remains a remarkably green city — in no small part due to action taken in the late Victorian era by people like Octavia Hill in response to the horrors of the Victorian slums. Today over 40 per cent is green space or open water. And the city, thanks in no small measure to work of your Society, still contains a remarkable diversity of wildlife. You have documented over 2,000 species of flowering plant. LNHS members have recorded forty-seven species of butterfly, 1,173 moths and more than 270 kinds of spider around London. The tidal Thames that was lifeless in 1858 now supports 120 species of fish. And London's wetland areas support nationally important populations of many water birds. Over sixty species of birds nest in central London — a peregrine, I hear, has even been seen flying past our office on Victoria Street. So it should be remembered that we can, and do, make a huge difference. Our recently published *State of the Natural Environment* shows that this is true across the country — where we, as a sector, target our hard work, knowledge and money, we are successful.

This sharing of knowledge to put together the big picture is vital to us as an evidence-based organization. Reliable high-quality biological records are central to our biodiversity work, to make sure we spend money where it can make the most difference and to inform future policy decisions, by ourselves and others. We rely heavily on the data and records collected and shared by local societies and enthusiasts across the country. That is why we are investing, despite an incredibly tight budget settlement, £640k in Local Record Centres in 2008/9. And we hope to put a longer-term funding package in place very soon. The key, I think, to conserving the diversity of London's wildlife in the long term lies in reaching out to the city's seven and half million inhabitants and reconnecting them to the natural world.

Your Society, I know, is a firm believer of this approach — you have had people out searching for elusive mole crickets, worked with fishermen to survey river flies, had ramblers searching for ancient elms and now school children surveying earthworms — now if ever there was a case of picking the right audience this must be it! We all share a passion for biodiversity but we need to enthuse others. We need to use our combined knowledge of the natural world and show people that our biodiversity, our natural heritage, matters, and that it is important to them, that it is **theirs**. We need to show that the natural environment holds the answers to many of our contemporary problems, just as it it did 150 years ago. Contact with nature means that people lead happier, healthier lives. Wild green spaces help the city deal with climate change — moderating temperature extremes and managing flood water naturally. There is nothing new here, but the link between happier, healthier lives and a healthy natural environment has been forgotten. If we are to meet today's challenges — deal with increased pressure for development, growing populations, and the impact of climate change — we need to mend that link.

I couldn't help noticing that the proposed title of today's last talk alludes to this problem — '2058: plenty of wildlife; where are the naturalists?' The challenge for the next fifty years is to reach out into every corner of the capital ensuring that the cohort of budding naturalists is every bit as diverse as London's wildlife. The London Natural History Society has worked tirelessly to ensure that there is a plentiful supply of wildlife and naturalists. Long may it continue!

Natural history societies and the London area: problems and possibilities down the years

DAVID E. ALLEN

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This paper was presented at the Society's 150th anniversary conference 'London's Natural History — past, present and future' held in association with the Linnean Society of London and the Society for the History of Natural History at Burlington House, Piccadilly on 11 October 2008.

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Abstract

Considering the rich diversity of its surrounding countryside, London's failure to acquire a broadly based society with the study of that area's natural history as its primary concern until as late as *c.*1890 is a curious anomaly. For two and a half centuries by then a succession of gradually more formal groupings of either botanists or entomologists (but never of both) had been arising that, with one exception, had local fieldwork as their focus partly or wholly. All, however, proved comparatively short-lived. A continual preference for informality, which worked against growth and continuity, is suggested as the principal cause, though loss of a founder responsible for much of the impetus was repeatedly a factor too. The origins and eventual growth of the two bodies that merged to form the London Natural History Society in 1913 are recounted in outline.

Introduction

London has had the good luck to have grown up in a natural setting of still-rich diversity, a diversity not confined to just the surface but continuing beneath as well. In this respect it is not of course alone among Britain's cities. Southampton has a common close to its centre that can stand comparison with Wimbledon's, Bristol has the Avon Gorge immediately alongside, Birmingham has Sutton Park not far away, Liverpool has the finest range of sand dunes in these islands just to its north, Manchester has the Peak District . . . . There is no shortage of parallels.

Yet London is exceptionally well favoured, surely, by having superlative hunting grounds for naturalists on every one of its sides: Epping Forest to the east, then the Thames Marshes, the North Downs and from there round to the fringes of the Chilterns. All those and a goodly sprinkling of woods and heaths closer in.

It seems therefore paradoxical that this city should have had to wait significantly longer than its rivals for a society embracing natural history in all its branches and with its home area as its express focus. It was not indeed till as late as 1890 or thereabouts that a body with that dual character can be said to have at last begun emerging (Payne 1948–49). And by that time almost every town in Britain of any size, let alone the other cities, had anticipated the capital, in some cases by half a century or even longer.

How is that curious anomaly to be explained?

The role of the London-based national bodies

One conceivable hypothesis can surely be dispensed with straightaway. The persistent paucity and weakness in London of bodies with local fieldwork as their prime concern can hardly be blamed on the presence here of the august Linnean Society and the several similar, even more specialized counterparts of that which emerged to join it during the early nineteenth century as the previous corporate unity of science broke down. For all of those saw their role as a national one and had the world as a whole as their focus. They chose to have their offices, libraries and collections in London for the simple and obvious reason that this was the principal city of the nation, an indisputable fact which buttressed their claim to that superior status. London also contained a strong concentration of the leading figures in the respective sciences that these societies saw themselves as heading. Furthermore, it was the location most readily reachable by the fastest means of transport in that era, as well as the one probably most visited for social and other scholarly reasons, by learned men resident elsewhere in at any rate England and Wales. That London lay in the centre of an area itself rich in scientific interest was an accident of geography and of no particular concern to such bodies: they had a multitude of more-pressing priorities for study. Debating, and publishing on, the latest theories and the more momentous discoveries were the preoccupations appropriate to a national academy: carrying out the field investigations from which those theories and discoveries largely emanated was not. The furthest they saw it as seemly to step in that direction was to act as national co-ordinator, as the Geological Society most notably did (Rudwick 1963).

It is true that in the course of the years one or two of those bodies did give rise to unofficial offshoots whose activities included out-of-town excursions. One such was the shadowy Temple Coffee House Club of the seventeenth century's final decade (Jessop 1989), which helped to fill the vacuum that the Royal Society created for the London-bound among its naturalist Fellows by holding no meetings during the summer months. Another, much later, example is the Linnean Society Club, which for quite a lengthy period added rural saunters to its core purpose of sociable dinners (Harris 1971). In both those cases, though, camaraderie, exercise and fresh air were probably the paramount motives rather than targeted investigation.

Local field initiatives and their difficulties

That general spurning of the City's hinterland by the lofty layer of globally focused learned societies left a glaring hiatus, which it was continually open to humbler and less conspicuous groupings of naturalists to do what they could to fill. But for the best part of two centuries and a half botanists and entomologists alone existed in sufficient numbers to be capable of responding in any concerted fashion and they did so only fitfully. In the event, only a single one of their respective attempts at banding together to that end succeeded in surviving for more than a very few years and even that exception lasted no more than twenty.

To make matters worse, the plant-hunters and the insect collectors persisted in going their separate ways. Admittedly, those two sets of enthusiasts did not have much need to consort with each other. An entomologist could at least avail himself of a botanist's expertise for identifying food plants, but there was no reciprocal pull, while the botanists' still-traditional medicinal orientation tended to keep their field of vision narrower than it might otherwise have been. Until the 1830s, when the cost of printing fell steeply once steam-power was brought to bear on that, there was not even the lure of the greater affordability of a regular vehicle for the publishing of records of finds and captures if the expense of that was shared. Such communal set-ups as each specialism managed to generate had difficulty enough in simply staying afloat, as it was, without adding the complication of joint meetings, let alone pooling their efforts in a single entity.

At the root of the problem, as I see it, was the informal way of operating, the aversion to any structure apart from the collecting of subscriptions, that naturalists of those earlier generations — and, for that matter, some even down to very recent times — understandably preferred whenever a number of them solidified into a recognizable social entity. Even supposing they were acquainted with the formalities and rituals with which larger and grander bodies liked to furnish themselves, they would have condemned and rejected those as pretentious and time-consuming. There were good practical arguments for keeping things simple, in any case. Communicating with members other than by word of mouth and face to face was bound to be tedious (and circulating printed notices out of the question on cost grounds, given the scarcely more than nominal subscription rates), while meeting in a private room in a public house or someone's home, instead of a hall, required numbers to be kept tiny. Both considerations discouraged recruiting, especially of anyone living outside the immediate neighbourhood or for any other reason not quickly contactable. The greater intimacy that smallness led to was also a powerful social cement, an asset too valued to be lightly imperilled.

There was one major snag with that way of operating though: it did not sufficiently ensure continuity. Just as with populations of animals or plants, the smaller the numbers, the greater the vulnerability to disasters and to consequent extinction. The commonest disaster liable to befall such tiny bodies was the loss of a particular member, typically the founder, who had been supplying the main propulsion. That could be a senior figure to whose greater experience the other members had become accustomed to deferring, but it could equally be a brash young newcomer who merely had more drive and alertness to new possibilities than everyone else.

An example of the first of those might well have been Joseph Dandridge, the *eminence grise* of the original Aurelian Society — the first of three groupings of London's entomologists to bear that name in succession (Allen 1966). To judge from the warmth of the tributes paid in print to Dandridge's help and encouragement by collectors many years his junior, he must have had the major hand in rounding up and corralling them in that body, through which he would have been best able to exert a continuing influence. However, he was in his late seventies by 1742, the earliest that society is mentioned as being in existence, so presumably it was to his younger, more active days that those tributes refer. As two of those protégés of his were both portrait painters by profession, the fact that Dandridge was a textile designer of note (some of his work is in the Victoria and Albert Museum) and rose to be elected Master of one of the City's largest livery companies, the Merchant Taylors (Bristowe 1967), would assuredly have earned him in their eyes at least no small amount of respect. Though that society's demise is attributed by a contemporary source to the demoralization of its members after narrowly escaping with their lives when a fire broke out during one of their meetings, it seems to me that Dandridge's removal from the scene by death around that very time could just as likely have been the cause.

By contrast, the fortunes of a succession of similar initiatives on the part of London's botanists were closely bound up in each case with young men with more organizing zeal and determination than their peers.

Just such a person was Thomas Johnson, the leading spirit in the very earliest collective entity known to have emerged spontaneously among this city's naturalists — or indeed naturalists of anywhere else. This was a group of semi-fledged apothecaries who had acquired a fondness for what went by the name of 'simpling voyages' through attending the regular instructional outings that their livery company laid on, with a view to equipping its apprentices with the ability to identify in the wild plants of herbal reputation. A few had found those occasions so stimulating and enjoyable that for a year or two at least, in the late 1620s, they decided to hold some unofficial ones of their own. Whether the resulting parties of horsemen had a sufficiently consistent membership to merit being called a society is uncertain, though a contemporary letter survives in which that word is used in referring to them. But it may be that they saw themselves as merely '*socii itinerantes*' — fellow wanderers — in the words of one of the printed reports on their journeys and finds that Johnson wrote and circulated afterwards. At any rate, they appear not to have had any regular meeting-place or even thought the group worthy of a name.

Ephemeral though it apparently was, that initiative proved of importance in serving the enterprising Johnson with a springboard to greater things. Through those and later sorties he was to build up a knowledge of the vascular plants of southern England of a geographical extensiveness at that time without compare, on the strength of which he set about producing the work for which he is mainly renowned. This was an edition of the massive illustrated herbal by his predecessor, Gerard, purged at last of the numerous errors that it regrettably contained. I like to think that Johnson would have gone on to provide London, if not yet England as a whole, with a botanical society worthy of that name. Alas, though, the Civil War intervened, a natural leader like Johnson could not escape becoming enrolled and he was to lose his life in it while still only in his forties (Kew and Powell 1932).

Failures of more-ambitious initiatives

That official programme of summer 'herborizings' that the apothecaries' professional body succeeded in sustaining uninterruptedly for an astonishing three hundred years was never kept strictly private. Any keen field botanists in London who came to its notice were invited to come along and join in, and their enthusiasm and knowledge must have been more than welcome for the example they set to those of the apprentices who attended those occasions only with reluctance and disdain. The unfortunate result of that indulgent practice, though, was that it relieved the rest of the capital's botanists from any pressing desire for an independent body with perhaps wider functions.

Consequently, it was all of a century before another thrusting young man came up with a society that sounded from its title as if it was intended to fill that gap at last. That this was equipped with rules and minute books (one of which survives in the Natural History Museum) further suggested that the era of informality in such matters was at an end. Those appearances, however, were deceptive. For the twenty-two-year-old John Martyn, a frustrated clerk in the counting-house of his father in Cheapside, botany was first and foremost *medical* botany and a potential escape route to an alternative career much more to his taste. Founded and run on the model of a university student society, the new body mainly attracted would-be practitioners of medicine with their sights on professional destinations more elevated and remunerative than apothecary shops. Unlike prospective apothecaries, however, the respective universities they were attending were failing to provide the basic knowledge of herbs and their properties that medical students then newly needed in order to pass the exam leading to the all-important licence to practise. Martyn already knew enough to deliver a course of lectures to that end, which was sufficiently well received by his fellow members to give rise to an invitation to repeat it up at Cambridge. That put him on a road that would ultimately take him to that university's botanical chair, but once he was no longer regularly on hand to continue bowling the society along, it soon lost momentum and petered out (Allen 1967).

Fast forward now to the 1830s, and to the swelling of natural history's ranks by a mass of fresh converts — from a newly prosperous, newly earnest generation bent on sharing the interests of the wealthier and fully leisured.

During the preceding half-century the subject had found itself high fashion, thanks to the seductive simplicity of the Linnaean classification and the evidence thrown up for and by geology, by turns exciting and alarming. To the frustration of that horde of newcomers, however, almost all of the existing London societies were closed to them, the Entomological being the one exception. They found those not only beyond their pockets but above their heads and out of their geographical range. There was thus a need for an extra layer of bodies with less exacting entry requirements, less all-round loftiness and scientific concerns much closer to home. On to that invitingly empty stage there soon accordingly stepped yet another young man brimming with energy and ideas. The one this time was called Daniel Cooper, the son of an analytical chemist well-known in the city's medical circles.

Doubtless thanks to his father's own breadth of scientific interests, Cooper had not confined his attention to one branch of natural history up till then. Though primarily a botanist, he had also collected land and freshwater Mollusca, and in a little guide to the choicest localities in and around the capital for vascular plants of note, published in 1836 with the title *Flora Metropolitana,* he could not resist slipping in at the end, very incongruously, a list of the molluscs he had recorded as well. When, in that same year, he took the lead in providing London with a botanical society again — and not a medical one in disguise this time — perhaps it was that obliviousness of his to the compartmentalism that had dogged London's domestic world of natural history hitherto that lay behind the no less incongruous choice of a leading zoologist as its first president. Admittedly, John Edward Gray, the head of the British Museum's Natural History Department, was seen as a hero by many of the incoming generation, for having championed the rival Natural System of classification and suffered humiliation at the hands of Linnaean fanatics for that; and maybe it was that consideration that was the overriding one: he had been chosen to act as a red flag waving provocatively at the defenders of that now-dying cause.

Apart from that ideological overtone, another feature of the new society was that it emerged from one particular quarter of the city, in this case Lambeth. That was a further portent of things to come. Initially what was envisaged was probably just another small coterie of the kind seen already and due to be seen again in the now not-too-distant future. Perhaps it would have been called the Lambeth Botanical Society. But attention must have been drawn to the fact that botany was now the only major natural history science without a Metropolitan body devoted to it exclusively, so was decided to name it the Botanical Society *of London.* On top of that the idea arose of offering as one of the services to members periodic exchanges of duplicate herbarium specimens between those who were collectors. Once that was adopted, and in due course put into effect, the Society speedily acquired members scattered throughout the British Isles and thereby became a national body in all but name. That was a pity, for in other respects it promised at first to act as a proving-ground for an eventually wider body concentrating on the *local* flora and fauna. Soon after the start, indeed, one of the members, a Chelsea schoolmaster by the name of Alexander Irvine, went so far as to propose the compiling of a collaborative Flora of the London area. To that end he suggested the circulation of printed lists of species with 'columns for the insertion of the precise habitation of the species, the nature of the soil where it grows, the altitude of its locality, the time of flowering, and such like'. Alas, that was impractically utopian: more than another century would have to elapse before such a project became a reality (and in Warwickshire, as it happened).

Nevertheless, in its early years, before Cooper dropped out to become an army surgeon, the Botanical Society of London did have a strong local fieldwork dimension. A more realistic scheme that it did promote was the forming of herbaria representative of the flora of particular districts, one or two of which were indeed completed. Surprisingly, though, it never organized a programme of field meetings, merely holding one to celebrate the start of the flowering season, known as the 'First Excursion'. One of those that Cooper led had as its venue somewhere then so unfamiliar as to be described as 'a spot called Woking', chosen because easily reachable by the new London & Southampton Railway (as it was still necessary to point out). Which is a useful reminder that the Society's founding coincided with the start of that revolution in transport and the consequent opening up of the Home Counties to naturalists previously restricted to destinations reachable on foot only after a long preliminary tramp through miles of urban sprawl.

Of only the Society had been content with just that local fieldwork role, it might in time have expanded sideways to cover further aspects of natural history and so become the comprehensive body that the study of the London area badly needed. Unfortunately, it tried to do very much more — but on a subscription rate that it insisted on keeping low as a matter of principle. For it also saw itself as a poor person's Linnean Society, providing the same range of facilities as that, while at the same time employing the part-time taxonomist who eventually proved necessary for conducting the specimen exchanges efficiently. Once it became apparent that it could not afford all of that, a tug-of-war ensued between the two constituencies, the Londoners and the collectors in the provinces. That resolved itself unexpectedly, however, when it came to light that the finances had been allowed to fall into chaos. To avoid imminent bankruptcy, the Society had to be dissolved and its library and collections humiliatingly auctioned. But though that was the end of the London body, the specimen exchanges were salvaged from the wreckage and carried on, as an independent operation, by a sequence of volunteers. Half a century later they would serve as the healthy bole onto which what would eventually become the Botanical Society of the British Isles was successfully grafted (Allen 1986).

Hiatus afresh

Once again, London's field botanists were left without a collective home — or at any rate a substitute comparable with the one they had just lost. All that was available, and that only to those of school age in the main, was another little group founded in 1862, in recognition of the new hiatus, by the headmaster of a school in Lambeth, the colourfully eccentric Mordecai Cubitt Cooke, himself an expert of fungi (on which, and much besides, he was to write prolifically). His Society of Amateur Botanists — as he called it, over-grandly — had arisen out of country rambles on which he had been taking some of his pupils. After only two years, by then twenty strong, it found itself unable to afford the rent of a meeting-room, so a friend of Cooke's, Robert Hardwicke, one of the leading natural history publishers of the day, stepped in with the free use of one of his Piccadilly shops, an enviably central location though hardly a convenient starting point or terminus for field excursion (Ramsbottom 1931). Present at one of the meetings there, as a very shy young teenager, was the future long-time editor of the *Journal of Botany,* James Britten, who was to recall many years later that the proceedings were dominated by two somewhat older young men who were awesomely self-possessed. These were Henry Trimen and William Dyer, both to be professional botanists of renown (Dyer as Director of Kew) but at that time busy compiling their full-scale *Flora of Middlesex* that was to set a new high standard for works in that genre on its appearance in 1869 to wide acclaim.

It is hard to believe that it was entirely a coincidence that only three years earlier John Edward Harting had published an ornithological counterpart, his *Birds of Middlesex.* The two together suddenly made the natural history of a major part of the London area the subject of nationwide attention, while each must have served as a challenge to local naturalists to add further records. It could not have been a better moment for someone to step forward again and this time propose the founding of a society that would bring together naturalists of every stripe with an interest in taking further forward the study of London's flora and fauna. But, alas, incomprehensively, not a single person seems to have done so.

Yet in that very same decade, Liverpool, Manchester and Bristol, almost simultaneously, acquired bodies of just such a kind. The Liverpool one soon attracted such huge numbers on its field excursions — 400 regularly — that special trains had to be laid on by the railway companies to convey them. Manchester's capped that total with 550 on one occasion. The lectures and the soirées were proportionately massively attended as well. What on earth was wrong with London's naturalists? Why were they so slow to embrace a demonstrably highly successful organizational model, that lightened and more flexible one that had come to be known as the field club, which had now spread from its birthplace in the rural shires to reinvigorate natural history in the urban areas?

A comprehensive society emerges at long last

The best that London could come up with at that time, in response to those challenges from its rivals, were two minuscule bodies tucked away so obscurely in two so widely separate parts of the capital that they may even have been unaware of each other's existence. One was that Society of Amateur Botanists just described; the other, far away in the East End in the district sandwiched between Hoxton and Bethnal Green, was a comparable huddle of lepidopterists, calling itself the Haggerstone Entomological Society. Hatched out in June 1858 during the second of nineteenth-century entomology's three high tides, the one for which Edward Newman and Henry Tibbats Stainton deserved much of the credit, that recondite little coterie of collectors, was meeting every Thursday evening in a local public house. Yet, unlikely though it sounds — and certainly unlikely though it would have seemed to its members — this second body was to be one of the two progenitors of the now venerable and impressively hugh body whose sesquicentenary we are consequently celebrating here today.

Had it not been for the determined sleuthing of a past president of the LNHS, L. G. Payne, some sixty years ago now (Payne 1948–9), which extended to tapping the memories of one or two still-remaining survivors of that far-off infancy, much of the detail of how that remarkable transformation came about, through an abnormally prolonged and complicated adolescence, would by now have been irrecoverably lost. The result is a much fuller picture than most local natural history societies have been fortunate enough to inherit. On the present occasion, however, it is feasible to provide only a very broad outline of what Payne managed to piece together.

The Haggerstone entomologists carried on in their cosy little way, smoking long clay pipes in their chosen public house, for just short of thirty years. Early on, they had the permanent use of a spacious room above the bar, which they gradually filled with a library of 200 books and a communal insect collection of 2,000 specimens in a cabinet of forty drawers. Since as far back as the middle years of the eighteenth century, and especially in the industrial areas of the north of England, numerous similar bodies led just such an existence (Secord 1994, 1996), but almost all petered out comparatively quickly. It was a segregated subculture within the wider world of natural history, beneath the level of lecture rooms and curated museums: contented, intimate and virtually free (except for the beer and tobacco). The Haggerstone Society, though, was unusual in having no local competitors throughout that lengthy initial period. When natural history in Britain enjoyed one of its periodic booms, around 1890, there was thus no other body for newly arisen enthusiasts to join; and such was the inrush — of naturalists of all kinds, what is more — that the

Society was forced to accept the inevitable and exchange its alcoholic venue for a 'dry' one in the shape of a hall in Finsbury Square. In recognition of that altered character, it renamed itself the City of London Entomological and Natural History Society and, as a further gesture towards grown-upness, initiated a series of printed *Transactions*.

Around the same time a competitor at last materialized locally. This rather cheekily called itself the *North London* Natural History Society despite the fact that its horizon extended only to the city's north-east. This newcomer had had an even more hole-in-corner origin, for it was the extruded outgrowth of a field club formed in 1886 by some boys attending the Grocers' Company's School in Hackney.

Absurdly, for the next twenty years these two societies, with almost identical functions, were to coexist more or less side by side, latterly even using the same hall for their meetings, the one on the first and third Tuesdays of each month, the other on the alternating ones. The North London was less entomology-tilted and the more innovative, with annual 'Cycle Runs' as its particular speciality (the one in 1903 was to as far away as Reading and extended over three days). It was also the more broad-minded, electing a woman to its council soon after its start. It took its scientific work more seriously, too, with a series of Research Committees for different fields of study — one for ornithology, surprisingly belatedly, in 1908 — and defined the area with which those were to concern themselves, with an imperialistic sweep, as everywhere north of the Thames within a twenty-mile radius of St Paul's, of which twelve divisions were delimited for recording purposes. Still more ambitiously, it created two local branches on the city's eastern fringes, for those living too far out to attend the indoor meetings; that was risky, though, as geographically isolated entities, notoriously, have a nasty tendency to hive off into an independent existence.

Despite that wider menu, the North London found it possible to manage on an annual subscription of five shillings as against seven-and-six the other rated necessary. Not surprisingly, as early as 1896 the City of London Society was complaining that it was losing members to its rival. A couple of years later, in a Presidential Address, the famously forthright James William Tutt ventured to advocate a merger, pointing out that the two were competing in effectively the same territory, in which (in his words) 'there is plainly only room for one'. But hardly anyone in either camp was ready to listen yet. And it was in the end not until 1913 that sense eventually prevailed and a marriage was arranged, just in time for the London Natural History Society — as the combined body decided to call itself — to acquire the added strength needed to weather the subsequent wartime years (in which the worst that seems to have befallen it was reduced attendances at evening meetings caused by Zeppelin raids).

As if flexing its extra muscle, the new entity lost no time in annexing to its official area for recording purposes the equivalent expanse south of the Thames, with twelve divisions similarly (the existence of the South London Society notwithstanding). Another early move, but only against strong opposition, was the replacement of the North London Society's Research Committees with a series of Sections, which, unlike those predecessors, were open to any member to join. That was a necessary response to the now-ballooning membership numbers, which made a substantial measure of devolution as essential politically as it was convenient administratively. One or two of the subject subdivisions now had followings potentially large enough to constitute societies of their own and there was a risk of their breaking away if constricted too tightly. As early as 1908 the North London's ornithologists were so numerous that even running their research activity had required the services of four honorary secretaries to handle different aspects of the workload. The very least that the Sections had to be granted were their own committees and programmes.

In 1921 came the outwardly most noticeable change of all: the launching of *The London Naturalist,* in place of the North London's annual reports and the volumes of *Transactions* of the other. The pages of the new journal were soon being so flooded with records, and ornithological ones in particular, so much so that in 1936 the *London Bird Report* had to be published as a separate, companion serial. Meanwhile, the Society adapted to changing times in other, less-conspicuous ways. The electrification of the suburban railway lines and the expansion of country bus services had brought about a great surge in rambling, which in 1925 provoked the instituting of a Section for that. A further one for Ecology in 1935 similarly reflected, if rather belatedly, the strong following that new approach had gained in the natural history community in general.

London had thus acquired at last, if deplorably late in the day, what it had all along deserved: the largest *local* natural history society in these islands serving the needs of the largest aggregation of locally oriented field naturalists. In the manner of a limited company climbing to the size and success in the world of industry, it had reached that destination by way of a strategic merger, a carefully focused measure of specialization and continual structural flexibility. And not least, of course, with the help of a steady supply of dedicated, knowledgeable individuals.

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Book reviews

Wych elm. Mary Beith, Max Coleman, Brian Coppins, Ian Edwards, Stephen Helfer, Peter Toaig and Roy Watling. Editor, M. Coleman. Royal Botanic Garden Edinburgh. 2009. 148 pp. Paperback, £20. ISBN 978 1 906129 21 7; hardback, £25. ISBN 978 1 906129 25 5.

This is a lovely book packed with interesting detail and beautiful photographs. Published by the Royal Botanic Garden Edinburgh (RBGE) it commemorates the passing of their 200-year-old wych elm *Ulmus glabra* that succumbed to Dutch elm disease (DED) *Ophiostoma novo-ulmi* in 2003. In a collection of ten chapters by seven different authors the book celebrates this species of northern Britain. Scotland is the last stronghold of wych elm in Europe as DED continues it march north and west. The book records all aspects of an often forgotten tree from its folklore, practical uses to ecological relationships and its future as an important part of British flora.

Perhaps one reason for the tree's apparent obscurity is its association with death and misfortune. Apparently elms were favoured as gibbets (e.g. on Hampstead Heath) and Tyburn was known as 'the elms'. The durability of its wood made it good for coffins and there is a Kipling verse warning that wych elm hates people and waits to drop branches on them! There is even a saying in French 'meet me under the elm', which means I do not love you any more. It is about time it had some good press.

There is a chapter on lichen, another on fungal associations, and, of course, one on DED. The ecological information is detailed in terms of numbers of species associations but inevitably in such a modest work, less than 150 pages, it is often no more than a narrated list. Almost half the book is dedicated to the crafts people who were invited to create objects from the old RBGE tree. Several community projects involved local school children in creating an elm yurt and an 'achievement tree'. Other parts of the tree were used to make specially commissioned tables, jewellery, toys and a harp. The old tree lives on in those artefacts and the record of their creation which occupies the latter half of the book. The brevity of the book is slightly frustrating at times but there is a good bibliography and contact details for each of the craftspeople. This is more a popular text than an academic one and in some respects in falls between the two. However, it is much more than a coffee-table decoration and contains many interesting facts unknown to this tree enthusiast.

RUSSELL MILLER

Favourite trees. A celebration of the favourite trees of Epping Forest district. Editor, Tricia Moxey. Photographs by John Price. Epping Forest District Council and GreenArc. 2008. 132 pp. Not priced. No ISBN. Paperback. Only obtainable online: www.favouritetrees.com

The Favourite Trees project, recorded here, was a competition to find and celebrate the most popular trees of Epping Forest District. Predictably, most of the featured, winning trees are majestic veteran oaks of which Essex is so blessed. However, hornbeam, cedar, plane, beech, elm and horse chestnut are also represented. The book records a few details about each tree, there are 10-figure grid references for those who want to find them and lots of photographs. The book is precisely what it claims, a record of these favourite trees and the process by which people came to nominate them. It is linked to a bigger project to map and record on-line all the veteran trees of the district. There is a general resurgence in interest in our ancient tree heritage, pioneered by the Ancient Tree Forum. Whilst not apparently directly connected to the countrywide hunt (which according to Keith Alexander has so far mapped an amazing 47,500 old trees) this protect will do a great deal to increase both local and national awareness of the magnificent trees of Epping.

RUSSELL MILLER

The marine algae (seaweeds) of the tidal Thames: a systematic and floristic account

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This paper was presented at the Society's 150th anniversary conference 'London's Natural History — past, present and future' held in association with the Linnean Society of London and the Society for the History of Natural History at Burlington House, Piccadilly on 11 October 2008.

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Abstract

Not only was 1858 the year the London Natural History Society can trace its roots to, it was also the year of 'The Great Stink of London' following which major engineering works converted the Thames and its riparian environment into what is effectively a tidal canal. This had implications for the flora and fauna. This study presents the first full systematic and floristic account of the marine algal (seaweed) flora in the Thames Estuary from Southend (Essex) and Sheerness (Kent) in the outer estuary to Teddington at the inland tidal limit to the west of London. In total 64 species are briefly described, comprising 26 species of Rhodophyta, 11 species of Phaeophyceae (Ochrophyta), one species of Xanthophyceae (Ochrophyta) and 26 species of Chlorophyta. Historical evidence reveals the loss of two saltmarsh species characteristic of the former riparian environment, the spread of species to the rocky shore sea-walls now throughout the estuary, and the migration of species upriver following changes in salinity. A more diverse and species-rich seaweed flora is present in the lower reaches of the tidal Thames.

Introduction

This is the third assessment of the marine algal flora of the tidal Thames following conferences held by the London Natural History Society. The first, and the first comprehensive account of the seaweed flora of the estuary, was presented in 1975 at the 'Natural History of the Thames Estuary' conference (Tittley and Price 1977*a*); in addition to a checklist of species recorded, the main marine algal habitats were described and four floristic sections in the estuary were identified. A second assessment was presented at 'The Thames Revisited' conference of 2000 and reviewed changes in the marine algal flora using historical and then new information (Tittley 2001); this and another paper (Tittley and John 1998) gave new floristic information as checklists of species, and redefined the algal floristic sections of Tittley and Price (1977*a*). Also more recently, Tittley (2005) itemized the species records for Kent for the period 1597–1800 and identified the Thames locations of London, Rotherhithe, Charlton, Greenwich, Woolwich, Gravesend, Nore Buoy and Sheerness as important sites for historical seaweed data.

The present paper celebrates the birth of the London Natural History Society in 1858 (that unfortunately coincided with The Great Stink of London!) by presenting a first full systematic and floristic account of the marine algae of the tidal Thames. It briefly examines changes in the algal flora following the conversion of the Thames and its riparian environment to what is

TABLE 1. Sampling stations (see also Figure 1).

Letters indicate either a post-1999 revisit, or subsidiary locations investigated in the general area of the main location. Kent = Vice-county 16, Essex = VC 18, Surrey = VC 19, Middlesex = VC 21.

To end 1999	From 2000	County	Location sub-locations
0	a,b,c,d	Kent	Sheerness
1	a	Kent	Grain
2		Kent	London Stone
3	a,b,c,d	Essex	Canvey Island
4		Kent	Allhallows
	5a, b	Kent	between St Mary's Bay and Egypt Bay
5	c,d,e	Kent	Egypt Bay
6		Kent	Shornmead
	7	Kent	West Blythe buoy
	8 a, b	Essex	Shellhaven: A, E jetties
	9	Essex	Mucking buoy 1
	10	Essex	Shellhaven: no. 2 mooring buoy
	11	Essex	Mucking buoy 7
	12	Essex	Mucking buoy 5
	13	Essex	Mucking buoy 3
	14	Essex	Ovens buoy
	15	Kent	Lower Hope buoy
	16 a, b, c	Kent	Cliffe: Jetty mooring buoy, Jet jetty fixed, Jet jetty mooring buoy
	17	Kent	Higham Buoy
	18	Essex	Coalhouse Point buoys
	19 a, b	Essex	No. 6 and No. 2 groynes
	20	Kent	Shornmead Light
	21	Kent	Denton: sea-school mooring buoy
	22 a, b, c	Kent	Denton: PLA tide gauge, Clubs jetty, dolphin, PLA camel pier, mooring buoy, floating pier
	23	Kent	Gravesend Pier
24	a	Kent	Gravesend
25		Essex	Tilbury
26		Kent	Northfleet
27		Essex	Tilbury Dock
28		Kent	Swanscombe
29	a	Kent	Greenhithe
30		Kent	Littlebrook
31		Essex	Purfleet
32		Kent	Long Reach
33	a	Kent	Crayford Marsh
34		Kent	Erith Marsh
35	a	Kent	Erith
36	a, b, c, d, e, f	Essex	Rainham: Aveley Marshes
37		Kent	Belvedere
38		Essex	Dagenham Dock
39		Kent	Crossness
40		Essex	Barking
41		Kent	Tripcock Ness
42		Essex	North Woolwich
43	a	Kent	Woolwich
44	a	Kent	Thames Barrier
	45	Kent	Thames Barrier
	46	Kent	Charlton
	47	Kent	Greenwich
48	a, b, c	Surrey	Deptford Creek
49		Middlesex	Wapping
50		Middlesex	Cleopatra's Needle
51		Surrey	Chelsea Bridge
52		Surrey	Battersea Bridge
53		Surrey	Putney Bridge
54		Surrey	near Barn Elms
55		Surrey	Hammersmith Bridge
56		Surrey	Barnes
57		Surrey	Kew

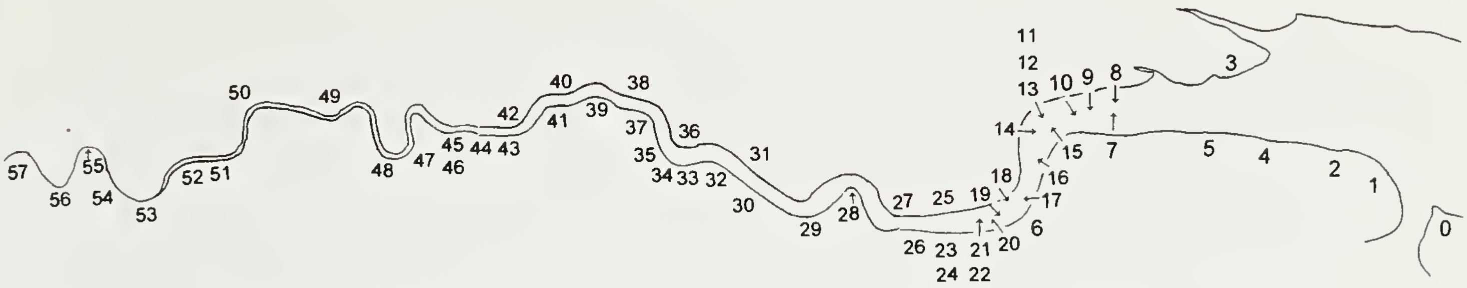

FIGURE 1. Sampling stations in the tidal River Thames (see also Table 1).

effectively a tidal canal with 'rocky' shores and, importantly, with the recent amelioration in water quality.

Since 2000 (cf. Tittley 2001), further fieldwork has been undertaken in the middle and lower reaches of the estuary. A detailed seashore study was undertaken at Rainham in Essex (Tittley et al. 2004), buoys, pontoons, jetties and other structures were sampled from Gravesend to Cliffe and Shellhaven, and intertidal sites were sampled at Erith Marsh, Greenhithe, Gravesend, Egypt Bay, Grain and Sheerness on the Kent side of the estuary and at Canvey on the Essex coast. Table 1 lists the sites sampled (shown in Figure 1) since surveys commenced in the early 1970s, and indicates those sites for which algal data were gathered prior to the millennium and those studied anew or revisited since then.

In the systematic account below, species of marine algae present in the tidal Thames are assessed individually. Algal nomenclature and taxonomy mostly follows Guiry and Guiry (2008). For each species its gross morphology is briefly described and its ecology outlined; size measurements apply to specimens collected or observed in the Thames, elsewhere and at other times of the year the same species may grow to a larger size. Complete species descriptions and identification keys are given in Brodie et al. (2007), Brodie and Irvine (2003), Christensen (1987), Dixon and Irvine (1977), Fletcher (1987), Irvine (1983), Irvine and Chamberlain (1994), and Maggs and Hommersand (1993). Sites at which the species have been recorded are given in square brackets. A reference to historical records or to their recent discovery in the estuary since fieldwork commenced in the early 1970s is appended to each species entry. Many species records are confirmed by specimens in **BM**. Some doubtful records from Sheerness are not included in the systematic list but considered briefly in the Discussion section. For further information on species distributions in the southeast of England see Tittley and Price (1977*b*) and Tittley et al. (1985), and for Great Britain and Ireland see Hardy and Guiry (2006).

The Thames environment: past and present

Today's estuary extends 140 km inland from the confluence of the River Medway in Kent and Southend in Essex to Teddington to the west of London. In Roman times the inland tidal limit was closer to the sea where Westminster now stands. Creeks dissected the marshy riparian landscape and there were islands such as the later named Bermondsey and Thorney; there were also banks of clean gravel and sand, and the river was much wider and shallower. The southeast of England has sunk at a rate of 30 cm per century since Roman times and land around London Bridge was then 5 m higher. The tidal range in the first century was 2 m compared with more than 6 m today. River water in the London area was almost fresh. In Roman times embanking and reclamation commenced and has continued to the present time with now very little fresh water, brackish and saline riparian wetland remaining. The banks of the tidal river have been progressively moved riverwards. By the seventeenth century the Thames was becoming canalized and directed, deeper and swifter in flow. A major feature at that time was the old London Bridge that acted as a tidal barrier and created a rapid caused by a 2 m difference in tidal height either side of the bridge. In the nineteenth century Teddington Weir was built and restricted the inland tidal effect thought to have extended to Slough (Attrill 1998). To the east of London in that century work commenced on the deep-water London Docks on the marshy Isle of Dogs and downriver at Tilbury. Another major engineering project that changed the face of London's river came about as a consequence of the 1858 'Great Stink of London' caused by the polluted state of the Thames. This was the intercepting sewer system of Joseph Bazalgette. From 1866 to 1870, 52 acres (21.6 hectares) were reclaimed from the river for the Embankment in central London that houses the sewer. Probably the most outstanding Thames engineering project is the world's largest movable flood barrier that is 550 m across and built at Silvertown in the 1970s. Accompanying this was the raising of sea-walls along the Thames and the construction of subsidiary barriers across the Roding and Cray tributaries.

The Thames has since Roman times been polluted by domestic and industrial discharges. Until the early nineteenth century there was a healthy fishery in the river and water was drawn for consumption. From the mid nineteenth to the mid twentieth centuries the river became increasingly polluted and devoid of marine life. From the 1960s a major effort was made to improve the water quality of the river and to encourage the return of flora and fauna (Attrill 1998). This has been largely successful.

Today the estuary and tidal river is narrow, deep, fast-flowing and canalized, with a large tidal range. Water quality is much improved and rarely becomes anaerobic. Salinity decreases from full sea water at Gravesend to fresh water in the inner reaches from Putney to Teddington. As a consequence of the sinking of southeast England, the deepening of the tidal reaches and the narrowing of the river, the middle reaches are becoming more saline and marine species are spreading upriver (Attrill 1998, Tittley 2001). The formerly extensive fringing marshy wetland is now restricted to a few places and remains best developed in the lower reaches at Rainham, Crayford, Gravesend and Canvey. The former greater extent of wetland can be appreciated from the early literature where for example *Vaucheria dichotoma* was found in the marsh ditches at Charlton (Withering 1792; see also Tittley 2005) and *Bostrychia scopioides* was collected in the late eighteenth century between Gravesend and Northfleet (specimen in **BM**; Tittley 2005). Both are now probably extinct in the tidal Thames. Introduced river walls today (Figure 2) create a rocky shore habitat (Figure 3) for plants and animals (Tittley 2001). The variety of materials used and structures built enhance marine algal diversity and this has been confirmed by recent surveys of sea-walls, and of buoys, jetties and other structures.

Systematic account

Rhodophyta, Bangiophycideae, Porphyridiales, Porphyridiaceae

Porphyridium purpureum (Bory de Saint-Vincent) K.Drew & Ross

A microscopic unicellular alga that forms aggregated masses seen as pinkish-red films.

Grows over mud on a vertical sea-wall at upper littoral level at Woolwich. [43]. Not recorded before 1972.

Erythropeltidales, Erythrotrichiaceae

Erythrotrichia carnea (Dillwyn) J.Agardh

Microscopic, uniseriate filaments that have quadrate to elongate cells and are pinkish in colour.

Grows epiphytically on larger algae at midlittoral levels; known only from Canvey in the outer estuary. [3, c]. Recorded only since 1975.

Bangiales, Bangiaceae

Bangia atropurpurea (Roth) C.Agardh

A small unbranched filamentous alga 5-10 mm long where found in the Thames; it is blackish-red in colour, uniseriate below, multiseriate above, and attached by rhizoidal outgrowths from the basal cell.

Occurs sporadically on river-walls at upper littoral level in the brackish reaches of the estuary, among green algae. [12; 37]. Recorded only since 1975.

Porphyra linearis Greville

Narrow, linear, ribbon-shaped monostromatic thalli to 50 mm long that are translucent purple-red in colour and arise from a minute stipe and discoid holdfast.

An early-season species found only at Sheerness at the mouth of the estuary, growing on boulders at upper littoral levels. [0d]. Recorded only recently (2008).

Porphyra purpurea (Roth) C.Agardh

Translucent, membranous, monostromatic, ovate-lanceolate fronds, blackish-red in colour, that arise from a minute discoid holdfast; it often grows to a large size (to 300 mm long).

A commonly occurring species in the outer estuary to Gravesend, occasionally found upriver to Greenhithe. *Porphyra purpurea* grows on sea-walls, jetties and other structures at midlittoral levels; also on floating buoys and pontoons in the washed zone just above water level. [0d; 1, a; 3; 5c; 16b; 18; 20; 22b; 23; 24a; 29, a]. There are historical records from Sheerness that date from the early eighteenth century (Tittley 2005).

Porphyra umbilicalis (Linnaeus) Kützing

Large translucent membranous, monostromatic, umbilicate fronds that grow to 50 mm long, and are blackish-red in colour. Young fronds are often rosette-like but with age become orbicular or elongated.

Grows only in the outer estuary at Sheerness on sea-walls and other structures at upper littoral level where it may be locally common. [0a, b, d]. There are historical records from Sheerness that date from the early eighteenth century (Tittley 2005).

Porphyra sp. A of Brodie & Irvine (*P. yezoensis* sensu Kornmann)

Small translucent membranous fronds, to 10 mm long in the Thames, that are rose-red in colour.

Grows epiphytically on *Polysiphonia fucoides* on a floating buoy near Higham and at low shore levels on a fixed tidal gauge near Denton. [17; 22a]. Recorded only recently (2005).

Florideophycideae, Acrochaetiales, Acrochaetiaceae

Acrochaetium virgatulum (Harvey) Batters

Minute tufts of sparsely branched uniseriate filaments to a few mm in length that arise from a disc formed of an aggregation of filaments.

Grows epiphytically on large algae at midlittoral level; known only from Canvey in the outer estuary. [3d]. Recorded only recently (2007).

Rhodochorton purpureum (Lightfoot) Rosenvinge

Plants consist of erect and prostrate uniseriate sparingly branched filaments 2–3 mm in length that grow compactly to form a red velvety turf.

Grows at mid and upper littoral levels in shaded situations (beneath the *Fucus* canopy in the outer estuary) on sea-walls and other structures. Occurs not uncommonly in the estuary as far upriver as Wapping. [5, c, e; 6; 24, a; 29a; 32; 33; 35; 36; 37`; 39; 41; 43; 49]. Not recorded before 1972.

Colaconematales, Colaconemataceae

Colaconema daviesii (Dillwyn) Stegenga

Minute tufts of irregularly-branched uniseriate filaments that grow to only a few mm in length and are reddish in colour. Erect filaments arise from a basal entangled mass of filaments.

Grows epiphytically on larger algae; a single record from Grain in the outer estuary. [1]. Recorded only since 1975.

Palmariales, Rhodothamniellaceae

Rhodothamniella floridula (Dillwyn) Feldmann

Plants comprise small tufts or cushions of brownish-red uniseriate filaments 5–10 mm in length that bind sand and silt. Erect filaments are sparingly branched and arise from colourless basal filaments.

Grows at midlittoral levels on sea-walls and other structures at a few places in the outer estuary. [1, a; 5]. Recorded only since 1975.

Gelidiales, Gelidiaceae

Gelidium pusillum (Stackhouse) Le Jolis

Small (to 10 mm in length) blackish, erect and prostrate fronds that form wiry tufts and are attached by lateral protuberances; plants form turfs over the substratum. Frond axes cylindrical to flattened and often much-branched; branching is distichous to irregular.

Grows on sea-walls, wood groynes and other structures at midlittoral level mostly in the outer estuary to Egypt Bay and Canvey. [0c, d; 1, a; 2; 3, a, c, d; 5, a, b, c, d]. Recorded only since 1977.

Gracilariales, Gracilariaceae

Gracilariopsis longissima (S.G.Gmelin) Steentoft, L.M.Irvine & Farnham

Blackish red branched cylindrical fronds (2–3 mm in diameter) that arise from a small discoid holdfast and grow to 300 mm long; often bears subsphaerical reproductive swellings (cystocarps).

Grows on stones, shells and other firm substrata at lower littoral levels at Grain and Sheerness at the mouth of the estuary. Drift plants are occasionally washed further upriver. [0a; 1a]. There are historical records from Sheerness that date from the early eighteenth century (Tittley 2005).

Hildenbrandiales, Hildenbrandiaceae

Hildenbrandia rubra (Sommerfelt) Meneghini

Bright red, closely adherent discoid crusts that grow over hard substrata; this species is distinguished from *H. crouaniorum* J.Agardh by the obliquely cruciate (versus zonate) division of the tetrasporangia.

Occurs on stones and cobbles at mid- to lower littoral level at Sheerness at the mouth of the estuary. [0a]. Recorded only recently (2007).

Corallinales, Corallinaceae

Corallina officinalis Linnaeus

Erect, stiff, feather-shaped (pinnately-branched) tufted fronds 20–30 mm in length, formed of jointed segments, and usually pink in colour. Fronds arise from a crustose base and bear swollen conceptacles that contain reproductive structures.

Grows on stones and cobbles at mid- to lower littoral levels at Sheerness at the mouth of the estuary. [0a]. There are historical records from the Buoy of The Nore that date from the late seventeenth century (Tittley 2005).

Gigartinales, Caulacanthaceae

Catenella caespitosa (Withering) L.M.Irvine

Blackish-red plants formed of erect or creeping, thalli that grow from a discoid base to 10 mm long. The upright and creeping axes comprise terete, swollen or flattened segments of irregular width.

Grows epilithically on sea-walls at upper littoral levels in the outer estuary. [0c, d; 1a; 3d]. Recorded only recently (since 2005).

Gigartinales, Dumontiaceae

Dumontia contorta (S.G.Gmelin) Ruprecht

Soft, narrow narrow terete blackish-red fronds when young, becoming hollow, inflated and twisted when old. Fronds arise in groups from a discoid base, grow to 200 mm long, and are irregularly laterally branched low down.

Grows epilithically on stones and shells at mid littoral levels in the outer estuary. [0a, d; 1, a; 2; 3a, b]. There are historical records from Sheerness that date from the eighteenth century (Tittley 2005).

Gigartinaceae

Chondrus crispus Stackhouse

Thalli comprise tufts (to 100 mm tall) of flabellate, flattened and divided blades that narrow basally to flat stipes and a small discoid holdfast. Blades are purplish-reddish-black in colour and often iridescent.

Grows on sea-walls, stones and shells at midlittoral levels in the outer estuary. [0a, c, d; 1, a; 2; 3, a, b, c, d; 4; 5c]. There are historical records from near Sheerness that date from the eighteenth century (Tittley 2005).

Ceramiales, Ceramiaceae

Aglaothamnion hookeri (Dillwyn) Maggs & Hommersand

A small pinkish-red, finely feather-like thallus 5–10 mm in length and formed of branched uniseriate filaments; branching is alternate-pennate or spiral, with a distinct main-axis that arises from a discoid holdfast.

Grows on sea-walls in shaded situations at upper midlittoral levels in the outer estuary. [0c, d; 1, a; 3c, d; 5a, c, d]. Recorded only since 1975.

Aglaothamnion roseum (Roth) Maggs & L'Hardy-Halos

A small pinkish-red, finely feather-like thallus 5–10 mm in length, formed of branched uniseriate filaments; branches spirally or irregularly distichously arranged and form corymbose apices. A distinct main-axis, naked below, arises from a discoid holdfast of rhizoidal filaments. Tetrasporangia and spermatangial branchlets are borne singly on a cell.

Grows on floating structures, sometimes epiphytically on larger algae, just below water level; restricted to the outer estuary. [3c; 23; 24; 25]. Recorded only since 1975.

Ceramium deslongchampsii Chauvin ex Duby (Figure 3)

Plants of greyish-red, erect filaments, pseudodichotomously branched with straight to incurved apices; filaments partially corticated and attached by rhizoids.

Grows on a variety of substrata (sea-walls, wood, stones, floating structures) at mid- to low littoral levels. [0a, c, d; 1, a; 2; 3, b, c, d; 5, c; 16b; 19b; 23; 24, a; 25; 29]. Recorded only recently but see Tittley (2005) for further comments.

Ceramium gaditanum (Clemente y Rubio) Cremades

Brownish-red erect filaments 5–10 mm in length, pseudodichotomously branched with adventitious laterals with forcipate apices; filaments completely corticated with small multicellular spines near the apices.

Grows on the sea-wall at midlittoral level at Canvey. [3d]. Recorded only recently (2008).

Ceramium virgatum Roth

Red irregularly pseudodichotomously branched erect filaments to 100 mm long that arise from a mass of rhizoids; filaments completely or partially corticated with straight or inrolled apices.

Grows at midlittoral level on sea walls at Canvey in the outer estuary. [3b, c]. There are historical records from Sheerness that date from the early eighteenth century (Tittley 2005).

Halurus flosculosus (J.Ellis) Maggs & Hommersand

Bright red tufts of di- or trichotomously branched unseriate filaments to 100 mm in length, formed of large cells visible to the naked eye. Filaments attached by basal rhizoids and may bear short lateral outgrowths with reproductive structures.

Grows on stones and cobbles at low littoral levels at Sheerness. [0a]. There are historical records from Sheerness that date from the early eighteenth century (Tittley 2005).

Rhodomelaceae

Bostrychia scorpioides (Hudson) Montagne ex Kützing

A historical specimen (**BM**) collected between Northfleet and Gravesend in the late eighteenth century.

Polysiphonia atlantica Kapraun & J.N.Norris

Brownish red tufted mats of branched filaments that grow to 15 mm long; filaments comprise an axial cell surrounded by 4 periaxial cells and measure less than 17 μm wide.

Grows on sea-walls at midlittoral levels in the outer estuary. [0c; 24a]. Recorded only recently (since 2007).

Polysiphonia fucoides (Hudson) Greville

Blackish-red tufts of variably branched filaments that grow to 150 mm long; filaments comprise an axial cell and 11-21 periaxial cells.

Common in the outer estuary on sea-walls, jetties and floating structures from mid to low littoral levels, and on floating structures just below the water line. [1, a; 3, b, c, d; 5a, d; 8a; 16a, c; 17; 21; 22a, b, c, d, e; 23; 24a; 25]. Recorded only since 1975.

Polysiphonia stricta (Dillwyn) Greville

Similar to *P. atlantica* but differs in forming erect tufts dark brown in colour with filaments 100 μm wide.

Grows on firm substrata at mid to low littoral levels and occasionally on floating structures. [0c; 1a; 5; 22d; 24a]. Recorded only recently (since 2000).

Chlorophyta, Trebouxiophyceae, Prasiolales, Prasiolaceae

Prasiola stipitata Suhr ex Jessen

Small (2–3 mm tall) green blades that arise from a stipe-like base and multicellular holdfast; the blade is usually wedge or fan-shaped. Cells of the blade are arranged in regular transverse and longitudinal rows and some cell walls are thickened to form transverse and longitudinal lines.

Grows on sea-walls in the outer estuary at supralittoral levels particularly in locations where birds have been standing. [3d; 5a, c]. Recorded only recently (2008).

Ulvophyceae, Ulotrichales, Gayraliaceae

Gayralia oxysperma (Kützing) K.L. Vinogradova

Plants comprise small green monostromatic blades 10 mm long, attached by a basal disc; blades are variable in shape, soft and filmy to the touch.

Grows at upper littoral levels on sea-walls in the middle reaches of the estuary. [18; 24, a; 26; 36b; 41; 43; 46; 48a]. Recorded only since 1975.

Gomontiaceae

Eugomontia sacculata Kornmann

Microscopic uniseriate branched filaments that grow through the calcareous parts of shells and stain them green.

Thus far found only at Grain in the outer estuary, probably under-recorded. [1]. Recorded only since 1975.

Monostroma grevillei (Thuret) Wittrock

Monostromatic green sacs or blades to 20 mm long that are silky and soft to the touch; thalli are initially saccate but split open on aging to become membranous; attached by a small disc.

An early spring species found only once at Allhallows in the outer estuary; it grew on shells in shallow standing water at midlittoral levels. [4]. Recorded only since 1972.

Ulotrichaceae

Ulothrix flacca (Dillwyn) Thuret in Le Jolis

Thalli are formed of green unbranched uniseriate filaments (15 mm long) of cells to 40 μm wide; cells often shorter than broad and contain a band-shaped chloroplast. A longer basal cell attaches the plant to the substratum.

Grows epiphytically on larger algae or epilithically at upper to midlittoral levels in the outer estuary. [0d; 3c; 26; 28]. Recorded only since 1975.

Urospora penicilliformis (Roth) Areschoug

Thalli are formed of green unbranched uniseriate filaments (to 15 mm long) of cells to 80 μm wide; cells contain a perforated chloroplast.

Grows on sea-walls at upper littoral levels and on floating structures just above the water line. Occurs throughout most of the estuary. [1; 16a; 18; 21; 24; 26; 28; 29; 32; 33; 34; 37; 39; 41; 43; 44a; 48a; 53; 54]. Recorded only since 1975.

Ulvales, Kornmanniaceae

Blidingia marginata (J.Agardh) P.J.L.Dangeard ex Bliding

Small green, mostly unbranched sometimes twisted tubular thalli (to 30 mm long) that are attached by small discoid holdfasts. Cells small (5–10 μm in diameter) regularly arranged in rows.

Grows on sea-walls, wood breakwaters, and on halophyte stems in saltmarshes at upper littoral and supralittoral levels; also on floating structures above the water line. Occurs widely and abundantly throughout the tidal Thames. [0d; 1; 2; 3; 4; 5a b, c, d; 22b, c; 24, a; 26; 28; 29; 30; 31; 32; 33; 35; 36, b; 37; 38; 39; 40; 41; 43, a; 44; 46; 47; 48a, b, c; 49; 50; 51; 52; 53; 56]. Recorded only since 1975.

Blidingia minima (Nägeli) Kylin

Small green tubular to flattened, mostly unbranched thalli (to 15 mm long) that are wrinkled or twisted and narrow to a small discoid holdfast. Cells small (5–10 μm in diameter) irregularly arranged except towards the base.

Grows on sea-walls, wood breakwaters and on halophyte stems at upper littoral and supralittoral levels; also on floating structures above the water line. Occurs abundantly throughout the tidal Thames. [0d; 1; 2; 3; 4; 5a, b, c, d; 20; 22b, c; 24, a; 26; 28; 29; 30; 31; 32; 33; 34; 35; 36, b; 37; 38; 39; 40; 41; 43, a; 44; 46; 47; 49; 48a, b, c; 50; 51; 52; 53; 56]. Recorded only since 1975.

Ulvaceae

Ulva (formerly *Enteromorpha) compressa* Linnaeus

Plants comprise green tubular to compressed, much branched thalli that grow to 150 mm long and 10 mm wide. Cells in places arranged in rows, otherwise irregularly organized; they contain a single chloroplast displaced to the apical end of the cell.

Grows in sea-walls at upper littoral levels; probably under-recorded in the estuary. [0c; 1a; 3c, d; 24a]. There are historical records from London, Greenwich, Woolwich and Sheerness that date from the late seventeenth century (Tittley 2005).

Ulva (formerly *Enteromorpha*) *flexuosa* Wulfen ssp. *flexuosa*

Plants comprise green tubular to compressed, little to much branched thalli to 100 mm long and 5 mm wide, and generally variable in morphology. Cells are arranged in longitudinal and transverse rows, rectangular in shape with a parietal chioroplast and 1–4 pyrenoids.

Grows mostly at upper mid littoral levels in the few remaining saltmarshes of the estuary. [30; 32; 34]. Recorded only since 1975.

Ulva (formerly *Enteromorpha) intestinalis* Linnaeus

Plants comprise tubular, inflated, occasionally compressed green thalli that grow to 100 mm long and 15 mm wide with occasional branches near the base. Cells usually irregularly arranged and contain a single chloroplast displaced to the apical end of the cell.

Grows on sea-walls and in saltmarshes at upper littoral levels where there is freshwater influence; also found in dykes containing slightly brackish or fresh water in the grazing marshes behind sea-walls. Occurs commonly throughout much of the tidal Thames. [1; 2; 3c; 4; 5; 6; 23; 24; 25; 26; 27; 28; 29; 30; 32; 33; 35; 36, a, b, c, d, e; f; 37; 38; 39; 40; 43; 44, a; 45; 46; 47; 48a, b, c; 51; 52]. There are historical records from Rotherhithe, Charlton, Greenwich and Woolwich that date from the early eighteenth century (Tittley 2005).

Ulva lactuca Linnaeus (Figure 3)

Thalli comprise flat membranous, distromatic green sheets that grow to 100 mm long and 100 mm wide; variable in shape and attached by a small obconical holdfast.

Grows on sea-walls at midlittoral and low levels where there are suitable substrata, and on floating structures just below the water line. Occurs upriver as far as Crossness. [0a, c, d; 1, a; 3, b, c; 4; 5, a, b, c, d, e; 6; 8a; 16a, b, c; 17; 18; 19a, b; 21; 22a, b, d, e; 23; 24, a; 25; 26; 28; 29, a; 30; 33, a; 34; 35; 36, f; 38; 39]. There are historical records from Sheerness that date from the early seventeenth century (Tittley 2005).

Ulva (formerly *Enteromorpha*) *prolifera* O.F. Müller in Oeder

Thalli are variable in morphology from unbranched green ribbons to 150 mm long and 10 mm wide, to much branched narrow tubes a few mm wide. Cells are arranged in longitudinal and transverse rows and each cell has a central or parietal chloroplast and a centrally placed pyrenoid.

Grows on sea-walls at upper midlittoral levels and also on floating structures above the water line. Occurs throughout much of the estuary. [0c, d; 2; 3, c; 5, a; 5, e; 6; 8a; 16c; 17; 18; 19a, b; 22b, d; 23; 24; 25; 26; 27; 28; 29; 30; 32; 33; 34; 35; 37; 38; 39; 40; 41; 43; 44, a; 45; 46; 47; 48a, b, c; 51; 52]. Recorded only since 1975.

Ulva (formerly *Enteromorpha*) *torta* (Mertens)

Thalli formed of fine filiform tubes to 50 μm wide and to 100 mm long and remain constant in width from apex to base. Filaments comprise 3–12 rows of longitudinally arranged cells.

Sporadically present on sea-walls at upper littoral levels, upriver to Greenwich. [6; 24; 30; 33; 34; 35; 37; 39; 41; 43; 44; 47]. Recorded only since 1975.

Cladophorales, Cladophoraceae

Chaetomorpha ligustica (Kützing) Kützing

Thalli formed of unbranched fine, uniseriate green filaments 40–80 μm in diameter that form interwoven masses.

Found only once at Tilbury. [25]. Recorded only since the late 1980s.

Chaetomorpha linum (O.F. Müller) Kützing

Thalli formed of unbranched coarse, uniseriate green filaments 100–700 μm in diameter that form interwoven masses.

Found at Grain where it grew in shallow standing water at midlittoral level. [1a]. There are historical records from Sheerness that date from the early eighteenth century (Tittley 2005).

Cladophora fracta (O.F. Müller ex Vahl) Kützing

Plants formed of branched, fine green filaments; branches inserted almost vertically.

Found only once at Tilbury where it grew on a floating structure; a brackish and freshwater species. [25]. Recorded only since 1975.

Cladophora rupestris (Linnaeus) Kützing

Plants formed of coarse and stiff, much branched, bluish-green filaments that form tufts to 50 mm tall; branches are inserted obliquely and apical cells have blunt tips.

Occurs sporadically at lower midlittoral level on sea-walls in the outer estuary. [3c; 5c; 21]. Recorded only recently (since 2005).

Cladophora sericea (Hudson) Kützing

Plants formed of pale-green branched filaments to 60 mm in length; branches inserted obliquely; apical cells have pointed tips.

Occurs at midlittoral levels on sea-walls in the lower estuary to Crossness; also found on floating structures. [0d; 1; 2; 3c, 3d; 16b; 22d; 30; 41]. There are historical records from Gravesend and Sheerness that date from the early eighteenth century (Tittley 2005).

Rhizoclonium riparium (Roth) Harvey

Plants formed of pale to dark green unbranched filaments varying in length, that grow entangled to form mats. Cells of the filaments often develop lateral rhizoids.

Occurs commonly throughout the estuary at upper midlittoral levels on sea-walls and occasionally on floating structures above the water line. [0c, d; 1, a; 2; 3c; 5b; 6; 16b; 22d; 19b; 24, a; 26; 28; 29, a; 30; 31; 32; 33; 34; 35; 36; 37; 39; 41; 43, a; 44, a; 45; 46; 47; 48a, b, c; 49; 50; 51; 52; 53; 54; 55; 56; 57]. Recorded only since 1975.

Bryopsidophyceae, Bryopsidales, Bryopsidaceae

Bryopsis hypnoides J.V. Lamouroux

Plants formed of pale-green feather-like fronds to 100 mm tall; terminal branches arranged spirally or irregularly. Thallus is of siphonous uniaxial filaments.

Restricted to the outer estuary where it grew in a man-made pool at Canvey and on pontoons at Tilbury. [3c; 25]. Recorded only since the late 1980s.

Bryopsis plumosa (Hudson) C. Agardh

Similar to *B. hypnoides* but formed of dark-green feather-like fronds with the terminal branches arranged distichously.

Restricted to the outer estuary where it grows in a pool at Grain. [1a]. Recorded only recently (2005).

Codiaceae

Codium fragile (Suringar) Hariot ssp. *fragile*

Plants formed spongy cylindrical dark-green finger-like thalli; only juvenile growths to 10 mm high were found. The thallus comprises a pseudoparenchymatous aggregation of siphonous filaments. Medullary filaments are colourless, cortical parts (utricles) are pigmented.

Found only once (at Canvey) growing on the inner wall of a tidal swimming pool just below the water line. [3c]. Recorded only recently (2008).

Ochrophyta, Xanthophyceae, Vaucheriales, Vaucheriaceae

Vaucheria compacta (F.S. Collins) F.S.Collins ex W.R.Taylor

Plants comprise dark green, branched siphonous filaments that coalesce to form velvety mats that bind mud and silt. Distinguished from green algae by the absence of starch (stained black by applying iodine) and the presence of oil as a storage product.

Mats of *Vaucheria compacta* occur commonly at upper littoral levels on sea-walls throughout the estuary. [6; 24; 26; 28; 30; 32; 33; 34; 35; 39; 40; 41; 43; 44; 50; 51; 55]. There are historical records from Greenwich to Woolwich that date from the early eighteenth century (Tittley 2005).

Vaucheria dichotoma (Linnaeus) Martius

Known only from historical records from Charlton, Greenwich, Woolwich and Gravesend that date from the late seventeenth century (Tittley 2005). The species grew '. . . in marsh ditches . . .'.

Phaeophyceae Sphacelariales, Sphacelariaceae

Sphacelaria nana Nägeli ex Kützing

Plants comprise small brown branched filaments a few mm in length that coalesce to form a turf. Filaments of segments that may be unicellular towards the apex and divided longitudinally lower down.

Grows at upper littoral levels on sea-walls in shade. [0.d; 3d]. Recorded only recently (2008).

Ectocarpales, Acinetosporaceae

Pylaiella littoralis (Linnaeus) Kjellman

Plants comprise light-brown, much branched uniseriate filaments to 50 mm in length. Cells contain discoid chloroplasts; uni- and plurilocular sporangia are formed in intercalary chains.

Grows at upper middle and lower shore levels on sea-walls, wood groynes and other substrata and also on floating structures above and below the water line. Occurs commonly in the estuary to Woolwich. [0d; 1, a; 3b, c; d; 4; 5, a, b; 6; 16b; 19a; 22d; 24, a; 25; 26; 28; 29; 30; 32; 33; 34; 35; 36f; 37; 39; 41; 43; 44]. Recorded only since 1975.

Chordariaceae

Elachista fucicola (Velley) Areschoug

Plants comprise small light-brown globular pustules a few mm in diameter from which arise assimilatory filaments 5–10 mm in length.

A common epiphyte that grows on *Fucus* spp. in the lower reaches of the estuary. [0c; 1, a; 3c; 5b, c, e; 6; 16b; 22e; 24, a; 26; 29a; 31]. Recorded only since 1975.

Ectocarpaceae

Ectocarpus fasciculatus Harvey

Plants comprise small, light brown, much branched unseriate filaments to 20 mm long. Cells contain ribbon shaped chloroplasts; sporangia formed in series laterally or occasionally terminally on the filaments; plurilocular sporangia wider in the middle.

Occurs occasionally on sea-walls and floating structures in the outer estuary. [3c; 17; 21]. Recorded only recently (since 2005).

Ectocarpus siliculosus (Dillwyn) Lyngbye

Similar to *E. fasciculatus* but differs in having plurilocular sporangia not in series, elongate and narrow in shape and sometimes with a terminal hair. Found once on a sea-wall at upper midlittoral level at Greenhithe. [29]. Recorded only recently (since 1975).

Scytosiphonaceae

Petalonia fascia (O. F. Mueller) Kuntze

Thalli comprise light to dark brown blades (50 mm long, 20 mm wide), irregularly ovate lanceolate in shape with a small basal stipe that arises from a discoid holdfast.

Grows at midlittoral levels on shells and stones, and on floating structures in the outer estuary. [1a; 3b, c; 4; 17; 22e]. Recorded only recently (since 1972).

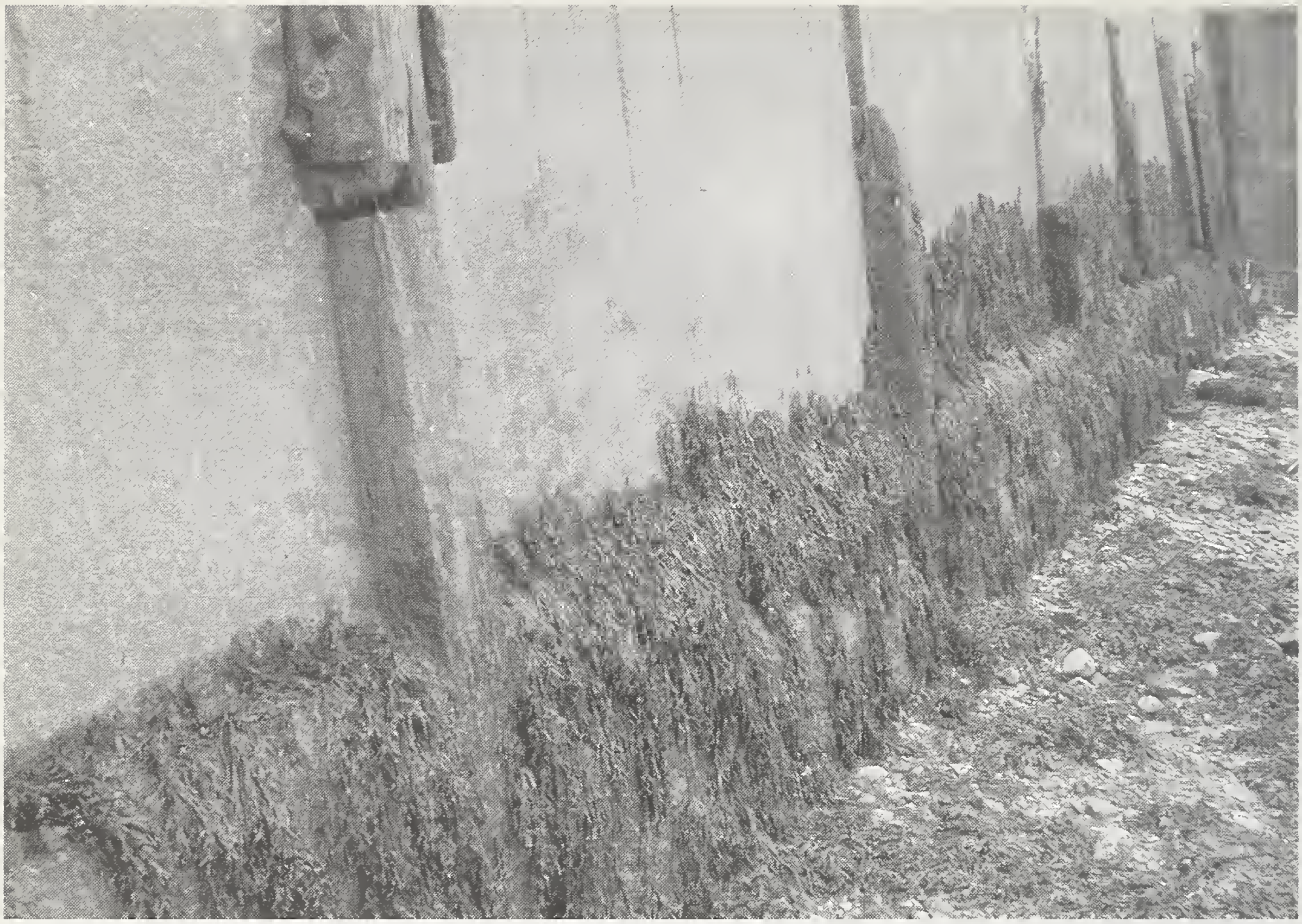

FIGURE 2. Overview of the main algal community with the bladder wrack *Fucus vesiculosus* as the characterizing species, growing on the river wall and foreshore at Gravesend.

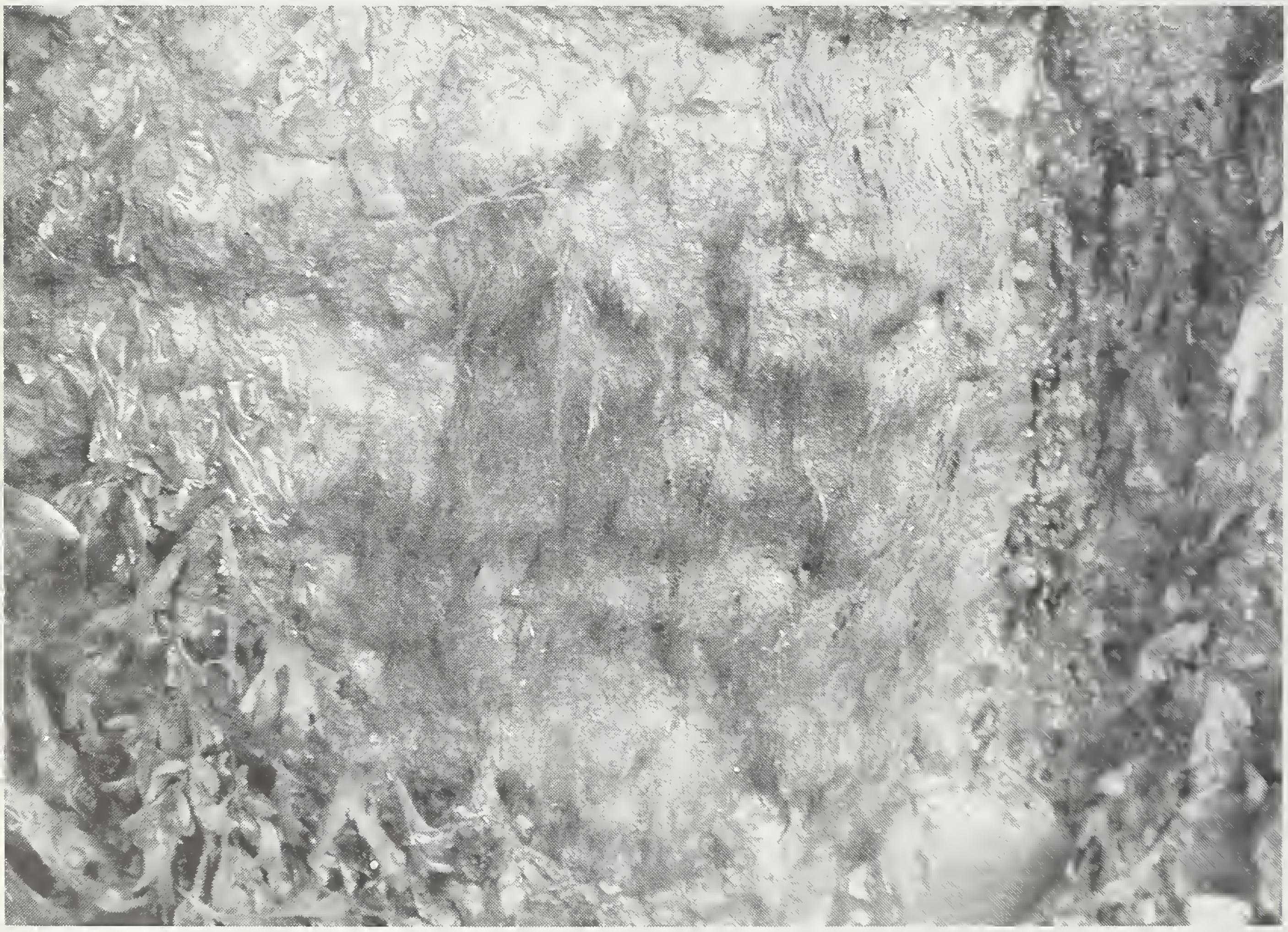

FIGURE 3. Close-up of the algal community on the river wall at Gravesend showing the brown alga *Fucus vesiculosus* (bottom left), the green alga *Ulva lactuca* (upper left) and the filamentous red alga *Ceramium deslongchampsii* (centre).

Stragularia clavata (Harvey in Hooker) Hamel

A dark-brown crustose alga that is irregularly discoid in shape (to 10 mm diameter). The margins of the thallus are closely adherent to the substratum.

Grows on stones and shells at midlittoral levels in the outer estuary. [1; 2; 3b; 4; 5, b]. Recorded only recently (since 1972).

Ralfsiales, Ralfsiaceae

Ralfsia verrucosa (Areschoug) J. Agardh

A blackish-brown crustose plant that is similar in form to *S. clavata;* it differs in being thicker and having margins that can be peeled from the substratum.

On rocks, cobbles and shells at midlittoral levels in the outer estuary. [1; 2; 3; 5, c]. Recorded only recently (since 1975).

Fucales, Fucaceae

Ascophyllum nodosum (Linnaeus) Le Jolis

Thalli comprise olive brown, flattened to terete strap shaped fronds to 1 m in length, with oval bladders at intervals along the frond; thallus attached by a basal discoid holdfast. Reproductive receptacles formed on globular lateral branchlets.

Grows at midlittoral levels on sea-walls and other structures in the outer estuary; commonly found as drift. [0d -drift; 1, a; 3, c; 5, a, b, c, d]. Recorded only since 1975.

Fucus spiralis Linnaeus

Plants comprise a dark brown, linear, dichotomously divided, sometimes twisted, frond with a distinct midrib and entire margin, to 200 mm in length and 20 mm in width; the frond narrows at its base to a stipe (continuous with the midrib) that arises from a discoid holdfast. The receptacles are terminal on the frond, swollen and rounded, and have a distinct sterile margin.

Grows at upper littoral levels on sea-walls and other structures in the lower estuary. [0a, d; 1, a; 3, c, d; 4; 5, a, b, c, d; 6; 24; 25; 26; 27; 28; 29; 30; 32; 33; 38]. There are historical records from Sheerness that date from the late eighteenth century (Tittley 2005).

Fucus vesiculosus Linnaeus (Figures 2 and 3)

Similar to *F. spiralis* but larger (to 400 mm in length), has paired bladders along the frond, is not twisted and the receptacles lack a sterile margin.

Grows at upper littoral levels on sea-walls and other structures in the lower and middle reaches of the estuary to Woolwich; drift plants have been found further upriver. [0d; 1, a; 2; 3, a, b, c, d; 4; 5, a, b, c, d, e; 6; 16b; 19a; 21; 22e; 23; 24, a; 26; 27; 28; 29, a; 33a; 34; 36, a, b, c, d, e, f; 37; 38; 39; 40; 43; 44]. There are historical records from Gravesend and Sheerness that date from the late seventeenth century (Tittley 2005).

Discussion

Recent field studies

Currently 64 species of marine algae (seaweeds) have been recorded in the estuary from Sheerness and Southend to Teddington. This total comprises 26 species of Rhodophyta, 26 species of Chlorophyta, 11 species of Phaeophyceae (Ochrophyta), and one Xanthophyceae (Ochrophyta). At several locations there are algae for which species determinations could not be made because of the absence of reproductive and other structures (e.g. species of *Ectocarpus*, *Sphacelaria*, *Acrochaetium* and *Cladophora*). Five species not listed above, have been identified provisionally. These are *Ceramium cimbricum* H.E. Petersen, *Ceramium pallidum* (Nägeli ex Kützing) Maggs & Hommersand, *Callithamnion corymbosum* (J.E. Smith) Lyngbye, *Ulva* (formerly *Enteromorpha*) *linza* Linnaeus, *Punctaria tenuissima* (J. Agardh) Greville collected from just below water level on floating structures in the outer estuary, and *Polysiphonia harveyi* J. Bailey that grew on stones at midlittoral level at Canvey. The outer marine section of the estuary (Southend and Sheerness to Gravesend and Tilbury) currently contains 57 species while the brackish reach from Gravesend to Greenwich contains 24 species (20 in the subsection from Gravesend to Erith, and 14 in the subsection from Erith to Greenwich). The inner low salinity section to Barnes holds 8 species. Most red algae are restricted to the outer section, fucoids penetrate into the brackish reach to Woolwich, and green algae such as *Rhizoclonium riparium* and *Blidingia* spp. occur throughout the estuary.

Analysis of post-1970s species records suggests three groups (Table 2), (i) overlooked species such as the microscopic or crustose forms, (ii) unrecognized species distinguished with difficulty from similar species, (iii) newcomers, species that have possibly spread to the estuary as a result of the creation of new (man-made) habitats or are non-natives.

TABLE 2. Post-1970 records.

(i) Overlooked	**(ii) Unrecognized**	**(iii) Incomers**
Acrochaetium virgatulum	*Blidingia marginata*	*Ascophyllum nodosum*
Aglaothamnion hookeri	*Blidingia minima*	*Bryopsis hypnoides*
Aglaothamnion roseum	*Ceramium deslongchampsii*	*Bryopsis plumosa*
Bangia atropurpurea	*Ceramium gaditanum*	*Codium fragile* ssp. *fragile*
Catenella caespitosa	*Chaetomorpha ligustica*	*Gayralia oxysperma*
Colaconema daviesii	*Cladophora fracta*	*Polysiphonia harveyi* (?)
Elachista fucicola	*Cladophora rupestris*	*Porphyra* sp. A
Erythrotrichia carnea	*Ectocarpus fasciculatus*	*Prasiola stipiutata*
Eugomontia sacculata	*Ectocarpus siliculosus*	
Gelidium pusillum	*Monostroma grevillei*	
Hildenbrandia rubra	*Petalonia fascia*	
Porphyridium purpureum	*Polysiphonia atlantica*	
Ralfsia clavata	*Polysiphonia fucoides*	
Rhodochorton purpureum	*Polysiphonia stricta*	
Rhodothamniella floridula	*Porphyra linearis*	
Sphacelaria nana	*Pylaiella littoralis*	
Stragularia clavata	*Rhizoclonium riparium*	
	Ulothrix flacca	
	Ulva flexuosa	
	Ulva prolifera	
	Urospora penicilliformis	

Recent fieldwork at Canvey on the Essex side of the outer estuary revealed a species-rich site where thirty-six species have been recorded. Six species were found there for the first time in the estuary and included the green algae *Bryopsis plumosa*, *Codium fragile* ssp. *fragile* and *Prasiola stipitata*, and provisionally the red alga *Polysiphonia harveyi*. *Codium fragile* ssp. *fragile* is a non-native species the likely origin of which is Japan. It was first recorded in Britain in 1808 (Farnham 1998) and now occurs mostly north of Durham and Northumberland on the east coast. Its occurrence at Canvey represents the first and only record for the southeast of England (cf Hardy and Guiry 2006). The provisional record of *P. harveyi* would represent the spread of another non-native species to the estuary, and the second record of the species for the east coast of Britain (the first was from North Essex, cf Hardy and Guiry 2006). *Prasiola stipitata* is a native species that occurs widely throughout Britain but which is probably under-recorded in the southeast. This first record for the Thames Estuary was subsequently supported by a second from near Egypt Bay on the Kent coast opposite Canvey. It is a species that occurs in nutrient-rich situations, in particular bird roosts; rocky sea-walls littered with bird droppings create a suitable habitat. The brown alga *Ascophyllum nodosum* (knotted wrack) is another species that has spread to the outer reaches of the estuary following the construction of rocky sea-walls (Tittley 2001). The red alga *Porphyra* sp. A (*P. yezoensis* sensu Kornmann) of Brodie and Irvine (2003) found in man-made habitats in the outer estuary, is a species that requires further taxonomic investigation and is possibly an alien. It has been recorded sporadically in Britain and is new to the Thames Estuary and the southeast of England.

Historical records

Of the sixty-four species now recorded for the estuary, historical information shows that fourteen have been present for many centuries and two others (*Bostrychia scorpioides* and *Vaucheria dichotoma*, see below) have probably become extinct; the remainder have been recorded only since detailed studies on the marine algal flora commenced in the early 1970s by which time our knowledge of the often overlooked microscopic and small species had improved considerably; older records were mainly of the larger forms.

There are historical records of species from Sheerness not listed above that have not been confirmed recently; these include *Ulva linza* Linnaeus, *Chorda filum* (Linnaeus) Stackhouse, *Cystoseira foeniculacea* (Linnaeus) Greville, *Desmarestia aculeata* (Linnaeus) J.V. Lamouroux, *Fucus ceranoides* Linnaeus, *Fucus serratus* Linnaeus, *Himanthalia elongata* (Linnaeus) S.F. Gray, *Saccharina latissima* (Linnaeus) C.E. Lane, C. Mayes, Druehl and G.W. Saunders, *Gloiosiphonia capillaris* (Hudson) Carmichael, *Plocamium cartilagineum* (Linnaeus) P.S. Dixon, *Polyides rotundus* (Hudson) Greville and *Polysiphonia lanosa* (Linnaeus) Tandy. Most of these records are based on drift material of species unlikely to have grown there. The absence of *Gloiosiphonia capillaris, Saccharina latissima* and *Fucus serratus* may be due to change in habitat as Sheerness was until the sixteenth century a shingle-cobble-shell spit (subsequently incorporated into the dockyard, see Tittley 2009) that could have provided suitable habitat for these algae; recent studies have revealed a more diverse community of algae in a similar habitat at Cheyney Rock to the east of Garrison Point, Sheerness, with twenty-seven species recorded (Tittley 2008). The red alga *Gracilariopsis longissima* (specimen in the Dillenian herbarium at **OXF**, collected in the early eighteenth century) was presumed extinct at Sheerness (its type locality; Steentoft et al. 1995). In 2005 a population was discovered growing in standing water surrounding a wood hulk at Grain (Tittley 2005, 2006) across the Medway Estuary, 2 km northwest of Sheerness; in 2007 the species was discovered on cobbles and shells at lower littoral levels at Sheerness (Tittley 2008).

In the Tittley (2001) *London Naturalist* paper it was postulated that the lack of early herbarium records of the saltmarsh red alga *Bostrychia scorpioides* hindered the recognition of its possible extinction in the tidal Thames. Since then a specimen was discovered in **BM** located to between Gravesend and Northfleet; it came from the herbarium of J. Lightfoot and was collected in the late eighteenth century when there was more fringing saltmarsh in the tidal river. Another species that has probably become extinct in the tidal Thames is *Vaucheria dichotoma*; it was widely recorded growing in marsh ditches in the seventeenth and eighteenth centuries (see Tittley 2005 for details).

Conclusions

The long history of algal study in the tidal Thames reveals changes in the algal flora as a consequence of the major alterations to its riparian environment with marshy banks replaced by rocky seawalls. Comparison of historical and modern records shows an upriver spread of species with increase in salinity. Recent field studies have recorded a species-rich and diverse algal flora in the outer estuary. The Thames Estuary is undergoing a marine transgression as a result of it becoming narrower and deeper, isostatic readjustment, and increase in sea level caused by climatic change. This will undoubtedly bring about further changes to the marine algal flora in terms of species present and their upriver distribution. There is therefore the need for the natural history societies of London, Essex and Kent to support future field studies in order to monitor and record such change.

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Beetles and bugs in London — a review of a changing fauna

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Abstract

Recently, numbers of introduced insect species reported in London, especially among the true bugs and beetles, have increased, possibly linked to affluence, climate change, and relaxed trade barriers. The city is acquiring a generalized urban colonist insect fauna, often associated with buildings or introduced plants, but with little in common with the fauna of the British countryside. Below, Max Barclay, Head Curator of Coleoptera and Hemiptera at London's Natural History Museum, discusses his perspective on this phenomenon.

Like most of the insects discussed here, I am an established introduction to London. Coming from a rural background, I accepted early on that my ambition to work in a major insect collection would involve moving to a big city, and consequently sacrificing the chance to collect and observe wildlife on a day-to-day basis. In 2001 I was lucky enough to realize my dream, when I was appointed as a curator in the Department of Entomology in South Kensington. The opportunity to work in Richard Owen's world-famous cathedral of Natural History, with 22,000 drawers of beetle specimens to be my teachers, soon swept away any reservations I might have had about the urban setting and about being isolated from nature, but it was an unexpected extra to find that there was, in fact, good collecting to be had even in the centre of the metropolis! What is more, it turned out that comparatively few collectors had paid much attention to the entomology of the little green cracks between the city blocks. The ornamental gardens, railway embankments, supermarket car parks and even buildings of the urban landscape have been quietly developing their own unique city fauna, quite different from that of the countryside, and full of surprises for the entomologist who doesn't mind taking out his beating tray or sweep-net under the watchful eyes of surveillance cameras and the bemused public.

The London Natural History Society, the anniversary of which we here celebrate, famously extends its dominion within a 20-mile radius of St Paul's Cathedral. This vast area of about 1,250 square miles includes some of the most diverse and entomologically interesting semi-natural sites in Britain. For example, Bookham Common, beloved by insect collectors and Society members for more than a century, boasts one of the longest beetle lists of any UK site, around 1,600 species, some 40 per cent of the British fauna. However, it is not with such rich and well-preserved sites that I am going to concern myself here, but with those beetles and bugs (Coleoptera and Hemiptera) that eke out a living in the built environment. Many of these are not 'native' British species, but have come in with our possessions, or most frequently with the vast diversity of alien plants with which we surround ourselves; like most of these plants, most of these insects apparently can't survive well outside the protective shell of the city, which provides them with a warm, low-competition environment.

Before we discuss the fauna of the built environment, it would be as well to reflect briefly on what this environment replaced. The Thames valley was probably always a warm and sheltered spot, and the unrestricted Thames shifted in its bed spawning floodplains and marshlands, surrounded by ancient forests of oak and beech. The draining and deforestation of this land to build the city largely took place before entomological records began, but the process was gradual. In the early 1700s, in his '*Epistle to the Right Honorable William Pulteney, Esq.*', the poet John Gay regarded Chelsea as an idyllic retreat from the pressures of city life:

'When the sweet-breathing spring unfolds the buds,
Love flys the dusty town for shady woods . . .
Then Chelsea's meads o'erhear perfidious vows,
And the prest grass defrauds the grazing cows.'

Anyone visiting Chelsea today would hardly expect to find woods, meadows or cows, although part of the old dairy remains on Old Church Street (albeit converted into luxury housing). Apart from the Physic Garden and the grounds of the Royal Hospital there is little green space in the whole district, yet as recently as 1796 there was a stag hunt there. The Victorians, founders of the London Natural History Society, inherited a larger city than Gay would have recognized, but still small by today's standards. Victorian concepts of London's practical boundaries are revealed by the debate in the 1860s on the site of the future Natural History Museum. The driving force behind the Museum, that great if irascible anatomist Sir Richard Owen, wanted somewhere further out where he could build freely ('*I love Bloomsbury, but I love 10 acres more*'); his bitter enemy, the equally great and almost equally irascible Thomas Henry Huxley, famously riposted that from the point of view of a London artisan '*it might as well be in New Zealand as South Kensington*'. Owen won this particular debate, but today we consider South Kensington's museums as Central London attractions, or at least, more so than New Zealand. Victorian energy had a lot to do with setting the bounds of the city wider still and wider, but their naturalists were as energetic as their builders, and have left us some records of the wildlife that was once to be found in those areas now engulfed by the urban sprawl. The impressive long, narrow weevil *Lixus paraplecticus*, now extinct in Britain, once abounded on waterside umbellifers on the long-since drained Hammersmith Marshes. The Reverend Canon Fowler, in his masterly *Coleoptera of the British Islands*, sends the reader to Tooting to search rotten oaks for the variable chafer *Gnorimus variabilis*, and observes that in the previous generation, Stephens had noted the same species from Brixton. Ancient oaks are, of course, not to be found today at either locality, and this dramatic beetle is barely hanging on in Britain at all, more-or-less restricted to a few veteran trees in the Windsor area, having lost what was probably one of its distributional strongholds in south London. The striking black longhorn *Cerambyx scopolii* probably occurred in the same forests, but was not so lucky, and is now entirely lost from our fauna, known from only a few old cabinet specimens.

Some other woodland species have persisted and adapted to the alteration of the land. The stag beetle *Lucanus cervus* is one such intrepid survivor, familiar to many city dwellers from urban parks and gardens. In fact it is easier to observe in the suburbs of London than it is in its natural habitat, and I have found adult males (which may range widely) in such unlikely places as the Wandsworth Bridge Road. The strong populations of the Thames valley are of international importance for a species that is apparently declining over much of its European range. The habit of many gardeners of cutting off unwanted or sickly trees and turfing over the roots, leaving a good supply of buried wood for the stag beetle larvae, has no doubt favoured this species, and it has now been adopted by many councils, societies and schools as a cause célèbre, so the leaving of wood piles and burying of wood and buckets of wood chippings for it is widely encouraged. Kew

Gardens had carved wooden statues of a male and a female stag beetle, and Bromley Council has street bollards decorated with reliefs of this impressive species. Hopefully all this publicity will help to reduce the death toll from callous or ignorant stamping, and the illogical fear that it still engenders in many people. Another woodland rarity, the two-spotted jewel beetle *Agrilus biguttatus*, was recently recorded on the upper decks of some London buses, where it was apparently harvested, via open front windows, from overhanging oak branches. This beetle appears to attack oak trees that are stressed, and those overhanging major bus routes may well qualify. So do the isolated, deer-browsed, sun-scorched sentinel oaks of London parks, such as Richmond. When the trees or their major limbs finally succumb, the dead standing timber (if the health and safety police will allow) becomes home for other rare beetles, such as the tumbling flower beetle *Tomoxia biguttata* (Mordellidae) and the bizarre, long, narrow ship-timber beetle *Lymexylon navale* (Lymexylidae).

Apart from the woodland relicts, another group of insects to be found in the city are those that live inside our buildings. Some have very specific tastes as to which buildings to occupy, for example the Palm House at Kew Gardens has for many decades been home to the only UK representative of the family Ptilodactylidae, *Ptilodactyla exotica*, a tropical beetle of unknown geographical origin which is now present in glasshouses in many cities. However, the majority of indoor species prefer our homes, especially those parts that most resemble the lairs of wild beasts, the grain stores of burrowing rodents, or hollow trees inhabited by spiders or nesting birds, for it is from such environments that most household species have come.

Among the largest synanthropic insects are the heavy, flightless, black, cellar or churchyard beetles of the genus *Blaps*. Three species have been recorded from Britain, but we can only be sure that one, *Blaps mucronata*, still survives here. Doubtfully native to our islands, many species of *Blaps* can still be found in caverns in the Mediterranean region, and they have probably shadowed us since our own troglodyte days, spreading with us, and finding the damper and darker of our buildings a good substitute for their caves. The beetles have been part of the urban fauna for some time, and, thanks to their tough cuticle, fragments are common enough in archaeological excavations. Jim O'Connor of the National Museum of Ireland tells of a thoroughly crushed specimen excavated from an eleventh-century Dublin site, which he suggests came to a sticky end beneath an angry Viking's boot. Although harmless, like many creatures of the night, *Blaps* has not generally been regarded with affection: The Reverend John Burrell, in his 1812 *Catalogue of insects found in Norfolk* notes that they are '*accounted by the vulgar to presage a death in the house*'. The baleful associations of this insect are not restricted to Norfolk. The generic name shares a Greek root with 'blasphemy', and several of the species names, *lethifera* and *mortisaga* for example, have inauspicious connections. As with the similar connotations of the death watch beetle *Xestobium rufovillosum*, this folklore probably originated because thrifty rural folk slept with the dusk and rose with the dawn, and would only have been awake to encounter the nocturnal fauna of their homes in exceptional situations, such as times of sickness. *Blaps* appears to subsist on the spilled food and dung associated with domestic animals and has no doubt suffered terribly from the decline of the horse as a means of transport. When I came to London, the house I lived in had a small dog paddock in the back garden, where fragments showed there had once been a population of *Blaps mucronata*, but I never saw a live one and it seems that the colony did not survive the removal of the dogs.

While at least one of the *Blaps* species persists, there is more doubt about the UK status of its predator *Sphodrus leucophthalmus*, a huge carabid beetle that feeds on *Blaps* larvae; no specimen has apparently been seen for some decades. While attention is paid to protecting endangered species in nature, and even rare breeds of domestic animals, nobody seems to care much about synanthropic species, and even in these conservation-minded days it is possible that one of our largest British ground beetles may be on the brink of disappearing, or has already disappeared, from our fauna unwept, unhonoured and unsung. If there is any hope for its continued survival, a good place to start might be London Zoo, where strong populations of *Blaps* have apparently survived since the days when both *Blaps* and *Sphodrus* were commoner sights in the city. To search for it, it would be necessary to get permission to enter the cages of some of the larger mammals during the night, which might not be without its difficulties!

Among the more intimate of our commensals are those insects that invade our living areas, our stored products and our insect collections, and their name is legion. At the Natural History Museum we wage war with several Dermestidae and Anobiidae species, including *Anthrenus sarnicus*, a large species first described from the Channel Islands in 1963. It now appears to have completely replaced the normal collections pest, *Anthrenus verbasci*, in the humidity-controlled environments of museum stores. We also have *Reesa vespulae*, a North American import that has the advantage of being parthenogenetic so a single individual can start an infestation. This species was a nuisance in the entomology collections for some years, and though it rarely attacked the frequently used main collections, it sometimes got into outlying collections, including, I am told, a collection of ladybird-shaped chocolates that someone had assembled and then forgotten about. *Reesa* has become very rare here since the demolition of the old entomology department (perhaps rather a drastic control measure, but effective). *Thylodrias contractus*, the so-called 'odd beetle', lives up to its name, with a peculiar larviform wingless female, and an equally peculiar long-legged male that bears no resemblance to the typical dermestid body plan, and has formerly been placed in a variety of unrelated families. We have so far managed to keep out the exceedingly destructive *Trogoderma angustum*, though it is apparently now present in some other London institutions; it is mainly against this menace that we freeze all incoming boxes of specimens. *Attagenus smirnovi*, humorously dubbed the vodka beetle, was described as recently as 1973, but is now frequent in many houses and shops in central London (and I have found it equally common in both Moscow and Prague). Although present at the museum, this species poses only a very minor risk to insect collections, preferring starchier, more-vegetarian fare such as dried seeds. It survives and breeds in the blue-coloured rodent poison left out in most public buildings, and no doubt is spread when the baits are transferred between buildings. It is sobering that several of our most frequently recorded pests were unknown to science fifty years ago, and it just shows how quickly species can establish, as well as how much work must still remain for beetle taxonomists. Some familiar pests have a much longer history: the biscuit beetle *Stegobium paniceum* is the famed 'weevil' of the old navy (though in fact not a weevil at all but a relative of the woodworms and death-watch beetles). It is the reason for sailors tapping their biscuits on the table before consumption, or in some stories, eating them in the dark. With the decline of the after-dinner smoke, the cigarette beetle *Lasioderma serricorne* has indulged its taste for strong flavours elsewhere, and is now usually reported from spices like cinnamon sticks and garam masala. The hide beetles, *Dermestes*, with their distinctive large hairy larvae, infest many London houses, especially those with dogs and cats, or with pigeon nests in the roof. The beetles fly in the evenings, and meaty fare, like dog biscuits or dead nestlings, is their preference. Although nocturnal, their name comes from their historic association with uncured animal hides, not from their tendency to 'hide' when the lights go on! Museum curators exploit their carnivorous appetites to prepare vertebrate skeletons, since a good colony can strip every last morsel of flesh, skin and hair from the bones, leaving a clean white skeleton. The same thing is occasionally reported with an undiscovered corpse in a London tower block, nothing amiss being noticed until the by then thousands of hungry beetles exhaust their food supply, and start swarming into other apartments in search of more. The characteristic grey-and-black bacon beetle *Dermestes lardarius* is no longer such a common sight — I have only seen it once in London. It has been replaced by the greasy brown *Dermestes peruvianus*, a comparatively recent import from South America, whose close relatives I have collected by light trapping in the depths of Bolivian rainforests.

The dark, damp corners of our homes may yield interesting species of mould-feeding Latridiidae; I recently lifted a *Vanity Fair* cartoon of Charles Darwin from a damp wall to reveal a large colony of the spindly, almost unpigmented *Adistemia watsoni*. As a keen coleopterist, who was stirred by the capture of rare beetles '*like an old war horse at the sound of a trumpet*', Darwin would no doubt have approved. He probably wouldn't have known this species, since it was described in 1871 (by his one-time friend T. Vernon Wollaston). It was Wollaston who drew Darwin's attention to the tendency of beetles on Oceanic islands to lose the power of flight, but the two later disagreed over *The Origin of Species.*

The most intimate of all, of course, are those species that invade our beds; the bed bug *Cimex lectularius* seems to be experiencing a well-publicized resurgence in London in recent years. We quite often receive specimens from student accommodation, and perhaps more surprisingly, an American visitor to the museum showed up brandishing a vial of *Cimex* from a Kensington hotel costing well over £100 per night! Fortunately, being an entomologist, he was more excited by his capture than irritated with the hotel.

Concerning household species, there are several essential messages. Firstly, the true distribution of most species remains poorly known, because entomologists only have access to a small number of domestic premises, and need to rely on chance enquiries from members of the public to record the species that occur in houses. Therefore, most synanthropic species, especially small, obscure, inoffensive ones like *Adistemia*, are generally regarded as much rarer than they probably are. Secondly, many such species are cosmopolitan, and in many cases their country of origin is unknown. Finally, the fauna is by no means fixed. New species are entering the 'synathropic system' all the time, and some of these go on to become widespread pests. Other species become rare or disappear as conditions change. If one of the founder members of the London Natural History Society came back today, he would be surprised at what he found in houses in modern London, and perhaps equally surprised at what he didn't find.

So, from houses we will now move to gardens, and this is where probably the most interesting changes are taking place in the fauna of the metropolitan area. Gardening, of course, is something of a national obsession in the UK. There are bestsellers about it, and I understand from television-owning friends that there are whole TV series dedicated to it too, so when people are not doing it, they can read about it or watch it. Gardening is a pastime for people who like to get outside, but are not fortunate enough to have discovered natural history, where their exertions could have served a useful purpose. We English traditionally love to eulogize our countryside and our native flora; Browning, in his *Home Thoughts from Abroad*, misses the buttercups — '*far brighter than this gaudy melon flower*'; Kipling's homesick Romano-British soldier longs for '*the scent of hawthorn in the sun, or bracken in the wet*'; Wordsworth raptures over his (wild) daffodils; Keats paints a wonderful picture of '*white hawthorn and the pastoral eglantine, fast fading violets covered up in leaves, and mid May's oldest child, the coming musk-rose full of dewy wine, the murmurous haunt of flies on summer eves*'. We have voted for the native bluebell, *Hyacinthoides non-scripta*, as our favourite flower, and wholeheartedly wish it well against the Spanish invader. Sadly, though, all this enthusiasm seems to be just so much talk. As soon as we actually get our hands on a little bit of the fabled English countryside to call our own, we rotovate it, plant it with neat rows of exotics, soak it in pesticides (around fifty million pounds worth per year nationwide) and any fast fading violet, pastoral eglantine or other representative of the native flora that raises its head is immediately eliminated as a 'weed'. As a well-known conservationist and arachnologist put it '*conservation stops at the garden gate*'; we all love nature, but not in our back yard. The bizarre schizophrenic relationship between gardeners and nature is what brought us the invasive Spanish bluebell, as well as other scourges like Himalayan balsam and Japanese knotweed that have escaped into the wild. Although the majority of exotic plants thankfully stay where they are planted, 'undead' ecosystems filled with plants of genera and even families unfamiliar to northern European invertebrates cover a significant proportion of the land area in the capital. Much of the familiar city vegetation, from London plane *Platanus* × *hispanica*, to London pride *Saxifraga* × *urbium* (the flower, that is, not the beer), to the ubiquitous *Buddleia*, is of alien or hybrid origin, or both. Although naturalists have habitually ignored such habitats, they in fact support a peculiar but surprisingly rich assemblage of invertebrates. These include common and adaptable UK species, generalist predators or fungivores like the 7-spot, 2-spot, 22-spot ladybirds and so on, as well as specialists on a particular plant family that have made the leap from native hosts to related imports. For example the weevils *Rhamphus oxyacanthae* and *Neocoenorrhinus aequatus,* usually found on hawthorn, can be collected in London from firethorn *Pyracantha*, and in the case of the latter, *Cotoneaster.* These are joined by species from outside the UK, often the original associates of an introduced plant, that have 'caught up' with it sometimes decades or centuries after the plant's initial introduction. Examples include the lavender beetle *Chrysolina americana*, a beautiful hemispherical red and gold striped leaf beetle that was first noted by Ian Menzies in the 1990s on lavender plants near St Thomas's Hospital on the south bank of the Thames. It has now spread over most of London and can be found adorning almost any lavender or rosemary plant, just as they can be found together in their southern European homelands. The name *americana* is a misnomer; Linnaeus, who described it, was apparently mistaken as to the type specimen's origin, since the practice of placing data labels on specimens was not at that time well established. A popular story that *americana* refers to this striped and punctured beetle's resemblance to the American flag is apocryphal; no such flag existed in 1758 when it was described. Other species that have caught up with their food plants include the hollyhock weevil *Rhopalapion longirostre* (arrived 2006) in which the female rostrum is at least as long as the body, and is used for drilling into the hollyhock seed capsules for egg laying, and the beautiful but much despised scarlet lily beetle *Lilioceris lilii,* which arrived some time ago, probably died out, and then arrived again in force, and whose larvae offend the sensibilities of many refined gardeners not only by defoliating their lilies, but by liberally coating themselves in their own excrement.

Besides these specialists, our city gardens are also home to a number of introduced species of more general tastes, many of which have also arrived in the last few years. The black vine weevil *Otiorhynchus sulcatus* is one of the most damaging pests of horticulture, and though it seems likely to be a human introduction, it has certainly been with us for a very long time. I believe it is customary to blame the Romans in such instances, especially since the beetle comes from southern Europe, quite possibly Italy. Recently, the reign of *sulcatus* has been challenged, as several other pest species of *Otiorhynchus* have arrived in London. *Otiorhynchus dieckmanni* was first found in 1959, when it was identified as the similar *O. setosulus*. It was not until 1979 that *dieckmanni* was described, from a German population (also introduced), and not until 2009 that it was realized that our *setosulus* was the same thing, and that the 1959 UK specimen is the earliest known example! The species is known only from introduced populations, its country of origin unknown. The large, pink-scaled *Otiorhynchus aurifer* was recorded in Essex by Paul Hyman in the 1980s, and then not again for twenty years, but is now widespread over much of London. Almost any afternoon of beating in southwest London will reveal *Otiorhynchus armadillo*, an attractive ochreous-brown-dusted species that now rivals *sulcatus* for abundance in the city. Unlike *sulcatus, aurifer* and *dieckmanni*, *armadillo* is not parthenogenetic, which directly led to its discovery in Britain, when my stepson told me one day that he had just seen two vine weevils mating. Since that is not a normal pastime for parthenogenetic species, I immediately rushed out and found the two *armadillo* still united, and a number of others on the bushes nearby. At the same site, Chelsea Harbour, I also found a colony of another imported vine weevil *Otiorhynchus salicicola*, which was first collected at offices in Victoria by Stuart Cole a few years previously. *Otiorhynchus cribricollis* was recorded in Chelsea in 2007 by Tom Harrison, and later in Fulham by myself. From 2006, populations of the southern European weevil *Brachyderes lusitanicus* were found on black pine *Pinus nigra* in Fulham. The same site (Imperial Wharf) produced the first UK records of at least three more southern European insects, the ivy-feeding woodworm beetle *Mesocoelopus collaris*, the tamarisk bug *Tuponia brevirostris* and the bush cricket *Phaneroptera nana*. Elsewhere in London, the first years of the new century gave us the first records of the green vegetable bug, or southern green shield bug *Nezara viridula*, a nearly cosmopolitan pest species that attacks a range of crops, especially runner beans. The first UK specimens, two nymphs from Queen's Park, were brought for identification by Mrs Judith Rose to an 'Insect Roadshow' at the Natural History Museum. When she passed them over and told me where she found them, I tried to be professional and contain my excitement, but must have resembled an 'Antiques Roadshow' host twitching in the presence of a lost masterpiece! Another famous arrival at about the same time was the harlequin ladybird *Harmonia axyridis*, which has rapidly become extremely widespread and abundant. I won't dwell on this species for too long since there is a whole talk in this series dedicated to it, but suffice to say that it is remarkable for its readiness to colonize natural as well as altered habitats, even becoming common in species-rich habitats like woodlands and grasslands that one might think were 'full'. This is something that *Otiorhynchus sulcatus* has failed to do after centuries (though it may be common in low-competition habitats like mountain tops and small islands). *Harmonia axyridis* is an east Asian species, well established in North America and much of Europe. A voracious aphid predator, it has in many cases been deliberately imported as a biocontrol agent. Much has been made in the tabloid press of the threat that it supposedly poses to UK biodiversity, but whether these speculations have any substance remains to be seen. They are certainly unfortunate, since they undermine the reputation of ladybirds, one of the few insects that most people sincerely like. Two much smaller 'biological control' ladybirds, *Rhyzobius lophanthae* and *Rodolia cardinalis*, both from Australia, are now established in London and feed (among other things) on the recently introduced cottony cushion scale insect *Icerya purchasi*. All three can be found together on gorse bushes in the Natural History Museum's wildlife garden, where they are vastly outnumbered by a lygaeid bug that feeds on the seeds of the London plane. These seeds are swept up by the ton in London streets every year, so represent a huge untapped food resource for any insect that can exploit them. However, London's plane trees had to wait several centuries, until 2006, before a seed predator arrived. When it did, it became enormously common within a year, and caused a great deal of press coverage because Museum entomologists were (initially) baffled by a bug found in their own garden! After much discussion taxonomists decided it was *Arocatus longiceps*, probably from southeast Europe.

Although we have moved a few exotic insects around the planet for years, it is in the last decade or so that the rate of arrival of exotic species in London has really escalated, and furthermore, the same species that have appeared here have arrived more or less simultaneously in other European cities. For example, on a 2007 trip to Juvisy, a suburb of Paris, Mike Morris and I noted *Rhopalapion longirostre, Harmonia axyridis, Nezara viridula* and *Phaneroptera nana*, all recent additions to the Paris fauna as well as that of London. *Otiorhynchus armadillo* arrived in London, Cardiff, Edinburgh and some Polish, Scandinavian and German cities at almost the same time. *Nezara viridula* spread northwards in Japan and the USA at the same time as in Europe, and our puzzlings over the identity of the *Arocatus* plane-bug were shared by entomologists from the Czech Republic, France, Germany, Holland and Spain, all trying to recognize what had just arrived on their doorstep. Clearly something new is happening. Climate change can explain a few of the cases, for as the temperature rises even slightly, insects shift their distribution northwards. This is probably the reason that the cosmopolitan *Nezara viridula* has simultaneously expanded northwards in Europe, Asia and North America. In their great work on the British Heteroptera in the 1950s, Southwood and Leston remarked that *Nezara* was a frequent import to the UK, but probably could not breed here; this statement no longer holds true. Climatic amelioration may also have benefited *Lilioceris lilii* and *Chrysolina americana*, but on its own is not a suitable explanation for most of the patterns that we are seeing, because the new distributions of the exotic insects are not contiguous, thus suggesting artificial movement rather than natural spread. Recent changes in trading patterns in the horticultural industry provide a much better explanation for the simultaneous appearance of the same pest species in numerous urban centres at the same time. While in the past, exotic plants purchased in Britain were generally grown in British nurseries from seeds or cuttings, today, with reduced transport costs and the relaxation of trade barriers between EU countries, vast glasshouses in southern Europe, particularly Italy, supply millions of plants, complete with pots and soil, to the whole EU. Thus, any beetle or bug that becomes well established in a large commercial nursery will inevitably be spread to all the cities that they trade with, which in the case of the big ones may be most of Europe. It is commonplace today, especially for housing developments or municipal plantings, to buy whole landscapes, plants, soil, pots and rock features, 'off the peg', and I have seen hedges with ten-foot-tall trees being literally put up overnight on newly cleared land. Shipped in huge bags of soil, such trees are often *Pinus nigra* or *Sorbus* spp., and are apparently part of large international shipments from a common origin. It is practically impossible to sterilize a large tree without killing it, so they must come complete with eggs, larvae, pupae and even adults of various invertebrates. If we consider the hundreds of tons of southern European soil brought to London every year, we shouldn't be surprised that we ship in new species of invertebrates at the same time. The warmer environment of the city combined with the presence of familiar vegetation will give these new arrivals a good start, and if they don't establish a colony this time, another wave will soon be deposited nearby.

So, what can we expect for the future? It seems likely that the present period of extremely rapid accumulation of new species for our fauna will continue for several years, in concert with most other European cities, until we have acquired all of the species of importance in southern European arboriculture and horticulture that can survive in London. This will be a period of homogenization, as the cities of Europe acquire a characteristic shared urban insect fauna, which may have little in common with the faunas of their respective countrysides. If the climate continues to become milder, the proportion of importee species that can survive will also increase. Eventually the rate of introduction will slow, but not stop, since additional species will be added to the 'horticultural system' with new suppliers, new plant species etc., and these will then be spread through the trade. Other species may decline or disappear as new insecticides appear or plant fashions change. Ultimately the horticultural invertebrate system will come to resemble that of the household insects discussed above, where the fauna changes, but more gradually than we presently see in garden insects.

One lesson from these observations on London insects is that the invertebrate fauna of the British Isles is extremely dynamic, and this would still be the case (albeit to a much lesser extent) without human interference. We speak glibly of 'native' and 'non-native' species, as if we have chosen some point in time after which any new arrival is 'too late' to be native, but what does 'native' even mean on an island that has been free of glaciers for just an eyeblink of geological time? We need clearly to separate incoming European species like the ladybirds *Rhyzobius chrysomeloides* and *Epilachna argus* from those from further afield, like the east Asian *Harmonia axyridis* and the Australian *Rhyzobius lophanthae*. It is absurd when one hears terms like 'alien' and 'invasive' being applied to something from France, a species which is really part of the same fauna, and co-exists throughout its natural range with many UK species of animal and plant, but just happens not to have reached the UK until recently. A collecting trip to Calais, or even the Channel Islands, will show how incomplete our fauna still is — there are many species that would be here if Britain was connected to the Continent, just waiting to get across the Channel; whether they eventually do so on a storm, on driftwood, or in the back of a truck, is not really important. Sometimes a species, especially something on the northern edge of its climatic tolerance, establishes for a few years, dies off, and later re-establishes. Others, that 'should' have got here earlier but were obstructed by the sea, can, once they arrive, reach Scotland within a few years. When one starts to take a more holistic view of the 'British fauna' as just a part of the north European fauna, our 'Red Lists' begin to look very peculiar in that they often completely fail to take into account European status. Several of the horticultural introductions to London are southern species, common in Italy, but on the edge of their range in England and thus considered rarities here. An example is the beautiful green weevil *Polydrusus formosus* (= *Polydrusus sericeus*). Currently listed as 'Nationally Scarce A', it was formerly known from a few vice-counties in southern England, but today it is present in huge numbers on ornamental deciduous trees, and is one of the commonest beetles in managed London habitats, though the urban populations are not connected to the rural ones. *Clitostethus arcuatus*, a tiny ladybird listed as 'Endangered', and at one time known from just one UK locality, is frequent on ornamental plants in London. The streaked bombardier beetle *Brachinus sclopeta*, also listed as 'RDB1: Endangered', was recently rediscovered on the Thames after eighty years with no UK record. Is it a great rarity, rediscovered after nearly a century? Or is it a very common southern European beetle that has been introduced into Britain more than once? Which scenario one accepts has great implications for how much one 'values' the species. With the accelerated change to the composition of the British beetle fauna likely to continue, I think it is time to re-evaluate the criteria we use for determining 'rarity' as well as terms like 'native' and 'alien'.

I hope that I have encouraged some people to look again at the insect fauna of urban areas, and London in particular. We live in entomologically interesting times, and London is probably one of the most interesting places in Britain to be. In spite of my initial reservations, if I do any British collecting now, I would rather investigate a London park than a natural forest, the reason being that one can be fairly sure beforehand what one might find in a forest, while in the city, one really has no idea what might show up. I have a box of London oddities that I have still not confidently identified, and most of them were found within a few yards of home or work. If you live in the city, your district may have a different, but equally interesting, insect assemblage just waiting to be explored!

Book reviews

Water-starworts (Callitriche) of Europe. R.V. Lansdown. London, Botanical Society of the British Isles. Handbook No. 11. London. 2008. 180 pp. £15, paperback. ISBN 978 0 901158 36 9. Obtainable from BSBI Publications, Summerfield Books, 3 Phoenix Park, Skelton, Penrith, Cumbria CA11 9SD.

This book comes in a clear plastic jacket which may give some very brief protection if it is dropped into the water or mud inhabited by its subject. It is issued as BSBI Handbook No. 11, and like the rest of that series is illustrated by numerous maps and clear drawings, the latter by the author and F.J. Rumsey, but differs from the rest of the series in its coverage of the whole of Europe. This should help the BSBI sell its other handbooks abroad, and encourage British and Irish botanists to look out for species not yet found in our islands. The most likely of these is probably *C. lenisulca*, near the upper limit of spring tides in southern estuaries; its fruits are virtually wingless, as in *C. truncata*, but unlike that species it has leaves joined in pairs at the base by a continuous ridge of tissue across each side of the node, as in most other British species.

The book does not make the field identification of water-starworts any easier than it was before, except by removing any possible ambiguity of the terminology used in describing the species, an important exception in view of the plasticity of many of the characters typical of aquatic plants. It does provide some less familiar characters available to users of the microscope, but for most of these fruiting material is necessary. Inevitably, British and Irish botanists will continue to record '*C. stagnalis* agg.' to include *C. platycarpa*, or even the desperate '*Callitriche* agg.' to include also *C. obtusangula* and now perhaps *C. palustris* as well, rather than risk errors by assuming that we can recognize the species by the appearance of the floating leaf rosettes. Dr Lansdown mentions this character, to be sure, but nowhere uses it in his keys.

RODNEY BURTON

Arable bryophytes: a field guide to the mosses, liverworts and hornworts of cultivated land in Britain and Ireland. Ron Porley. WILDGuides Ltd. 2008. 140 pp., paperback with plastic cover. £17.95. ISBN 978 1 903657 21 8.

For the most part the bryophytes of arable lands are tiny plants which have to be examined on hands and knees. Their lives are short as they are adapted to the frequent disturbance of their habitat. Although this book is called a field guide, and indeed most of the characters can be seen with a hand lens, inevitably there are occasions when particular features have to be examined under a microscope.

The book begins with a brief introduction to the growth forms, biology and reproduction of bryophytes. There is a note about the Survey of the Bryophytes of Arable Land, a recent BBS initiative to record the bryophytes in this specialized habitat.

There is a sort of index, covering all the eighty-six species likely to be met with, grouping them primarily according to growth habit, and including useful notes about identifying features, soils, relative rarity, and possible confusion with similar species. However, if someone is faced with a completely unknown specimen a conventional dichotomous key might be useful to narrow down the possibilities.

There then follows the main part of the book, which is a full description of the forty-seven species most likely to be found (though including a few real rarities), illustrated with captivating photographs which are augmented as needed by line drawings and photomicrographs to illustrate particular features such as root tubers. Under each species there is a note of important diagnostic features, an indication of habitat preferences — amount of water, pH etc. — and a distribution map. Sizes are indicated by the picture of a ladybird, though a measured scale bar might have conveyed the information more directly. The descriptions are in fairly straightforward language, with relatively few technical terms which are covered in a brief glossary.

This book is aimed primarily at those involved in agricultural land stewardship, such as farmers, but it would also be useful for botanists and anyone bryologizing in fields and farmland in the winter; the illustrations of root tubers are particularly useful. The species covered are at their most visible in the winter, and I look forward to trying it out then. The photographs are excellent, and do much to convey the charm of these lowly plants.

MARY CLARE SHEAHAN

London birds — past, present and future

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This paper was presented at the Society's 150th anniversary conference 'London's Natural History — past, present and future' held in association with the Linnean Society of London and the Society for the History of Natural History at Burlington House, Piccadilly on 11 October 2008.

Abstract

Since we have observed birds we have noticed changes in their populations and migration. What do we know has happened and what could happen in the future? Who has benefited over the decades, who has suffered and what are the factors behind this?

The London Natural History Society has a large recording area spanning twenty miles from St Paul's Cathedral. The habitat varies from the urban concrete jungle of central London with scatterings of green oases to the large wooded expanses of Epping Forest back to the man-made lakes and reservoirs dotting the recording area. This provides a great opportunity to look at various species pushed together.

The great cormorant is an interesting species to review. Before the 1910s it was rarely recorded in London but had increased by the 1930s. It was mostly seen during the winter months with a few summering records. Since 1888 a pinioned pair was kept at St James's Park with an additional pair being added in 1923. In 1931 they started nesting. What is interesting about this record is a wild bird was thought to have bred with a pinioned bird. But soon this collection died out. During the 1960s the maximum counts were 100 birds and slowly this number increased so by the 1980s the maximum counts were 200. This exploded in the 1990s so by 1991 the highest count was 500 and by 1997 it had reached 1,000. This dramatic increase is illustrated by Figure 1. Broadwater Gravel Pit was the first site to have wild breeding birds with a single pair in 1987. The breeding population was slow to start and breeding did not restart until 1991 when five pairs were found at Walthamstow Reservoirs. This population expanded rapidly with 208 pairs by 1998 and 360 by 2004. Now five more sites have breeding birds totalling another 75 pairs. Figure 2 shows this sensational increase.

So what do we know about these birds? We have two races breeding, *carbo* and *sinesis*. But why are they here? Two clear reasons: to breed and to feed. At Walthamstow Reservoirs they have ideal breeding habitat in the form of islands with no predators to worry about. With all the lakes and reservoirs across our area there are many potential breeding area to choose from. We have also created lots of places for their dietary requirements. This species is designed for long-distance migration so food can be gathered from a large area and is not restricted locally. It is not hard to speculate that high-flying birds seen coming in from the northwest could be fishing as distantly as the Midlands. As food sources in the North Sea have declined dramatically this makes London a great base to transfer your breeding population to. Ringing recoveries have shown that birds have come from the Farne Islands, north Wales and Abberton Reservoirs supporting this theory.

Back in the early 1980s, when I started birdwatching, corn buntings required some effort to locate. They were still breeding in London and places such as Rainham Marshes yielded large flocks. Since then the population has declined. This reduction has not happened overnight and was first noted in the 1950s in Surrey. When you look at Figure 3, which shows the breeding pairs in the

London Area, you can see that the numbers of sites reporting breeding pairs remained constant through the 1950s to 1980s. Once we reach the 1990s the number of sites reporting breeding drops and the number of pairs starts to reduce so by the start of the twenty-first century only a handfull of pairs are still present.

Looking at the maximum counts on Figure 4, there is a large peak in the 1980s possibly related to the cold winters of that decade. Since 1994 no count has exceeded a hundred birds. As with many species we tend to under record them whilst their numbers remain high; often only during national surveys are accurate pictures taken of the population. When the species decrease we then tend to look more intensely for them and so the data can become warped as we attempt to find the last surviving pockets of the population. So the chart may not produce a realistic change in the population of this species prior to the 1980s.

What has happened to our population? Clearly the changing usage of land will have a knock-on effect on this species. Being a seed-feeding species the more intensive farming methods reduce their food sources. With nationwide reduction in their population there are fewer birds looking for new areas to populate. Once one population finds food hard to come by and decreases the neighbouring populations do not replenish their number as they too are suffering.

The redstart was once a common breeding species with pairs found in Highgate and Hampstead in the early 1900s. The peak population occurred in the 1960s at ninety pairs reported from eleven sites — see Figure 5. Rapidly the number crashed so by 1977 only seven pairs remained and in 1995 our last pair bred. It is not clear why this species has disappeared so quickly from our woods. Numbers in surrounding counties have also dropped off. So what has caused this? Are our woods too well kept? Perhaps there is a lack of suitable nest site for them? Clearing our woods may cause this problem. Do we need to litter our woods with suitable nestboxes for them? Is there an issue with their food source; are there fewer insects for them? Perhaps the answer is us. Have we disturbed their habitat too much? Have we created too much access for everyone with walkers and cyclists now being catered for? Do we require more secluded areas to help with their breeding?

The tree sparrow population has followed a similar trend to the corn bunting. Peak counts came from the Essex section of our recording area with 4,000 reported in 1968. The numbers dropped off over the next few decades with no counts exceeding 300 birds since the 1980s — Figure 6 illustrates this. Since this time only one site has been able to maintain any population, Beddington Sewage Farm. This is unusual: unlike the corn bunting we still have a population of this species and the fascinating aspect of this is it is in an urban setting. A rural species doing well in our capital! We can make the same assumptions as to why the species is disappearing but why still at Beddington? Even with the site changing usage to a landfill site the population is hanging on. This is obviously aided with many nestboxes dotting the site, but more questions need to be answered before we can understand what is happening (Figure 7). With all these pairs breeding where do the young go? We would expect the surrounding areas to be covered in young tree sparrows but Beddington remains the main focus for all the sightings. Perhaps solving these questions will help us understand what has happened to the corn bunting and perhaps explain some of the issues with the house sparrow's reducing population.

Back in 1956 the first little egret reached London and we had to wait another twenty years for the next record. This white heron did not become annual until the 1990s but by 2002 the first double-figured counts were made. Figure 8 shows this rapid change and now birds are present not only during the summer months but throughout the winter as well, making this a resident species. In 2006 the first pair bred and has continued to increase. Figure 9 shows this growing population. Currently only one site has breeding pairs but this is unlikely to remain so for long as more colonies are likely to start up across our area. With mild winters, the increasing population in the near Continent and more wetland habitat being created, this species is likely to become a common sighting. The cleaner rivers of our capital will attract more of these birds and it is surely not too far away before it starts breeding in one of our royal parks.

The common tern is another success story. It was first recorded back in 1924 and despite the lack of knowledge in splitting this species from the Arctic tern, large numbers of common or Arctic terns were recorded throughout our area. Figure 10 shows that during nearly every decade since the 1950s the maximum counts have exceeded 400 birds. Clearly the area is an important migration route for this species. Breeding first took place in 1958 and took off in the 1970s, and Figure 11 shows this development. It is clear that our cleaner water and the creation of man-made water bodies have aided this species. Perhaps the most important of all is the man-made rafts created specially for this species. This provides a predator-free area to raise the young. During the 2000s another interesting development has taken place; family parties feeding for extended periods in the Thames in central London. Perhaps the future of this species could be rafts created for these tidal sections of the Thames as the next exciting development.

Next up is another summer migrant to our shores, the spotted flycatcher. Looking at the population there are few records of breeding birds. The main source of information comes from our Inner London area where the pairs breeding reduces from the end of the 1970s. The rest of the recording area number published shows a similar decline from the late 1980s. In 1989, 132 pairs were recorded and by 2004 only thirteen were left. Figure 12 shows this demise. This was once a common migrant but is now as rare as the pied flycatcher. What has happened to this insect-feeding migrant? Perhaps there are few nesting sites for this species like the redstart. Are we keeping our open spaces too tidy so no nest sites are available for them? My experience of their nest sites show they like poor brickwork in walls so gaps are present for nesting in, or ivy-covered walls with plenty of cover. By keeping our area tidy and clean do we affect birds that depend on this habitat to nest? Should we be thinking about their dietary requirements? Are there less insects for feeding on? It is likely we will lose this species within the next twenty years.

Another success story to look at, which may cause problems for our native avian species in the future, is the ring-necked parakeet. The ring-necked parakeet was first recorded in the area in 1970 but was only listed in bird reports from 1980. When you look at the breeding data we have in Figure 13, there is slow increase in breeding pairs. Compared to Figure 14 which displays the maximum counts we see that the breeding population recorded is only the tip of the iceberg as nearly 7,000 birds are present in the area. The population should be recorded in the thousands and not less than one hundred. Whilst the parakeet is able to feed and breed in our area, such a large population is likely to have a knock-on affect on our ecosystem. As they are a hole-nesting species perhaps others such as nuthatch, stock dove, or our woodpeckers, will be affected. Controlling the species at the current level may be the safest way to protect our native species.

What is happening to bird populations? The changing land usage means some bird populations will prosper whilst other will crash. We can see clear examples of this with species such as cormorants and corn buntings. Other farmland species are also affected such as grey partridge and skylark.

It is also apparent that with the reduced persecution and warmer climate our raptor species are doing better. We now have increasing populations of buzzards and red kites in the London area. Expect these birds to take advantage of our rich habitat. The changing climate may also attract overseas visitors such as black kite. Perhaps this will be the next species to take a foothold in this country? The downside of warmer winters may result in some winter visitors not visiting our shores. This has already happened with red-necked grebe, which is only occasionally turning up. Previously this was an almost guaranteed bird during the winter months.

Some species will find it increasingly difficult to secure breeding habitat within the expanding capital. The stonechat is likely to be affected by this and may struggle to continue as a breeding species. For these species it is important we protect their required habitat. The barn owl has already suffered and is dependant on small mammal populations to breed. Without ensuring enough suitable habitat is protected we will lose this as a breeding species.

With growing feral populations caution should be taken when deciding what action should be taken. In the 1980s grassland suffered with overgrazing by Canada geese so perhaps feral red-crested pochards will affect other species of duck that are native to this island. Will our pochard suffer?

Finally, what species will start to breed in a similar fashion to little egrets? Yellow-legged gull is already a common visitor during the autumn and winter months, so why not join the growing gull population in our city? Could this be the next species to breed in London? Whatever happens to our bird population we as birdwatchers or naturalists should monitor local populations regardless of how significant we think they currently are. Changing but exciting times for our avian population.

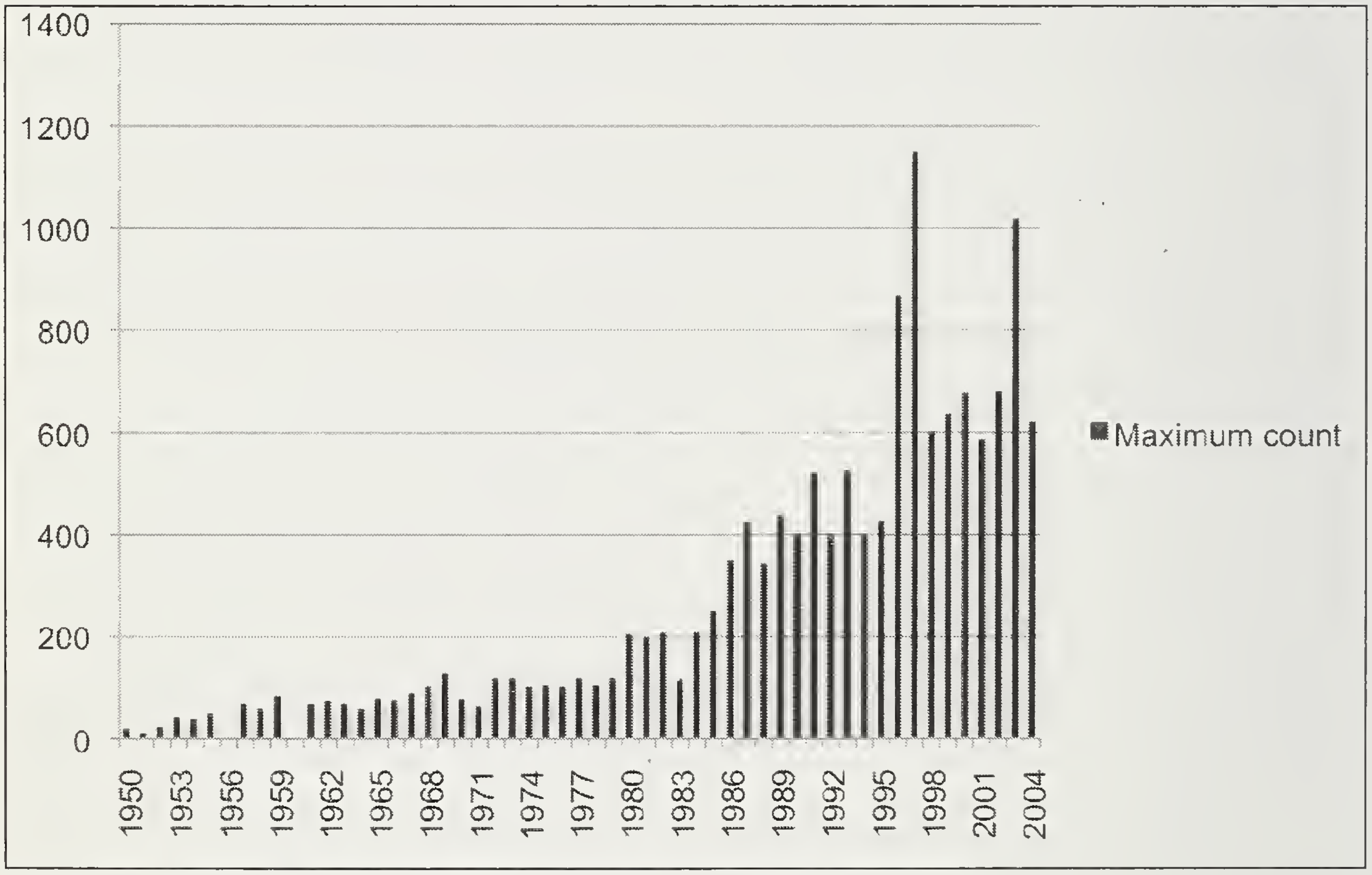

FIGURE 1. Great cormorant — maximum counts.

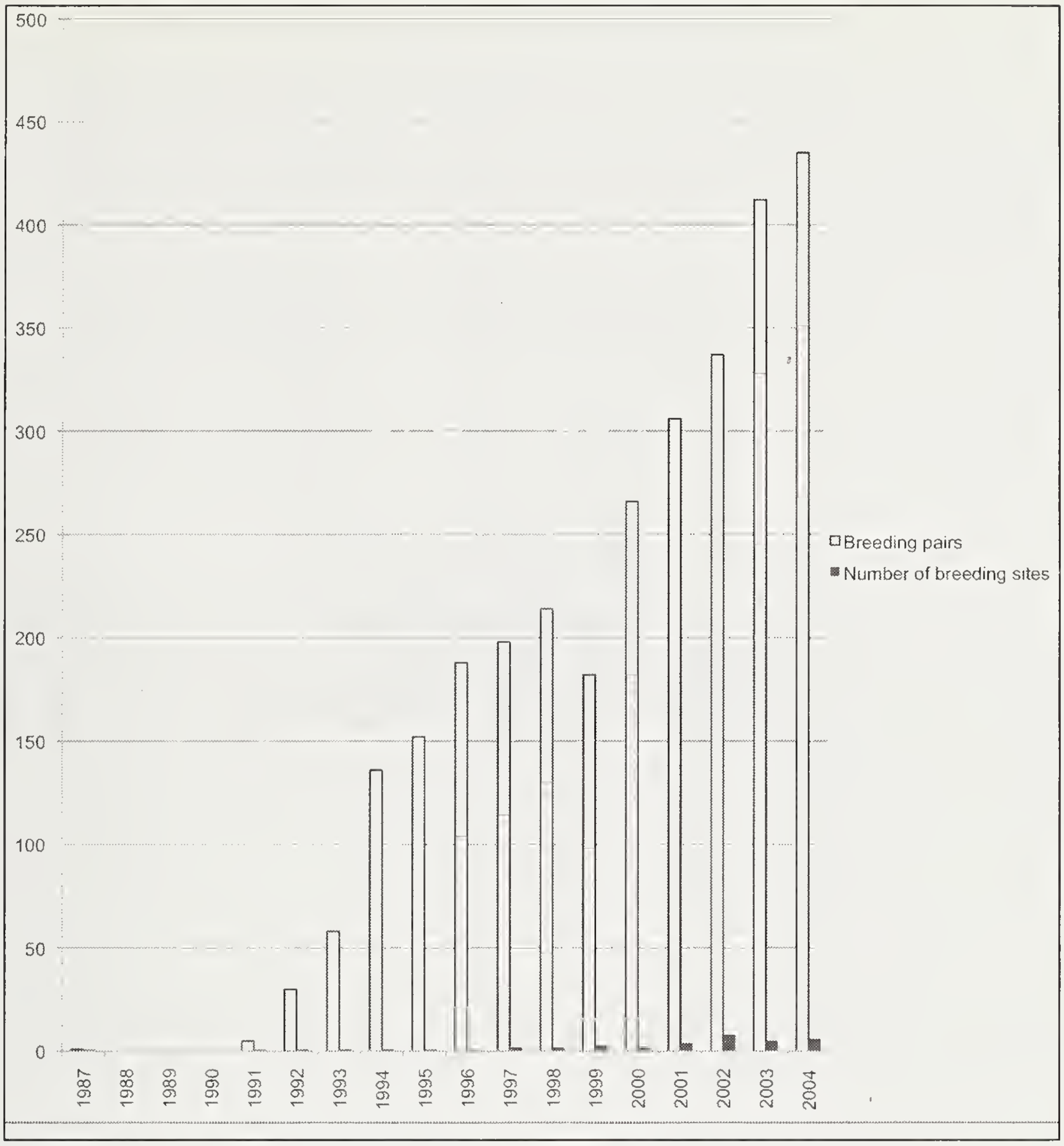

FIGURE 2. Great cormorant — breeding pairs.

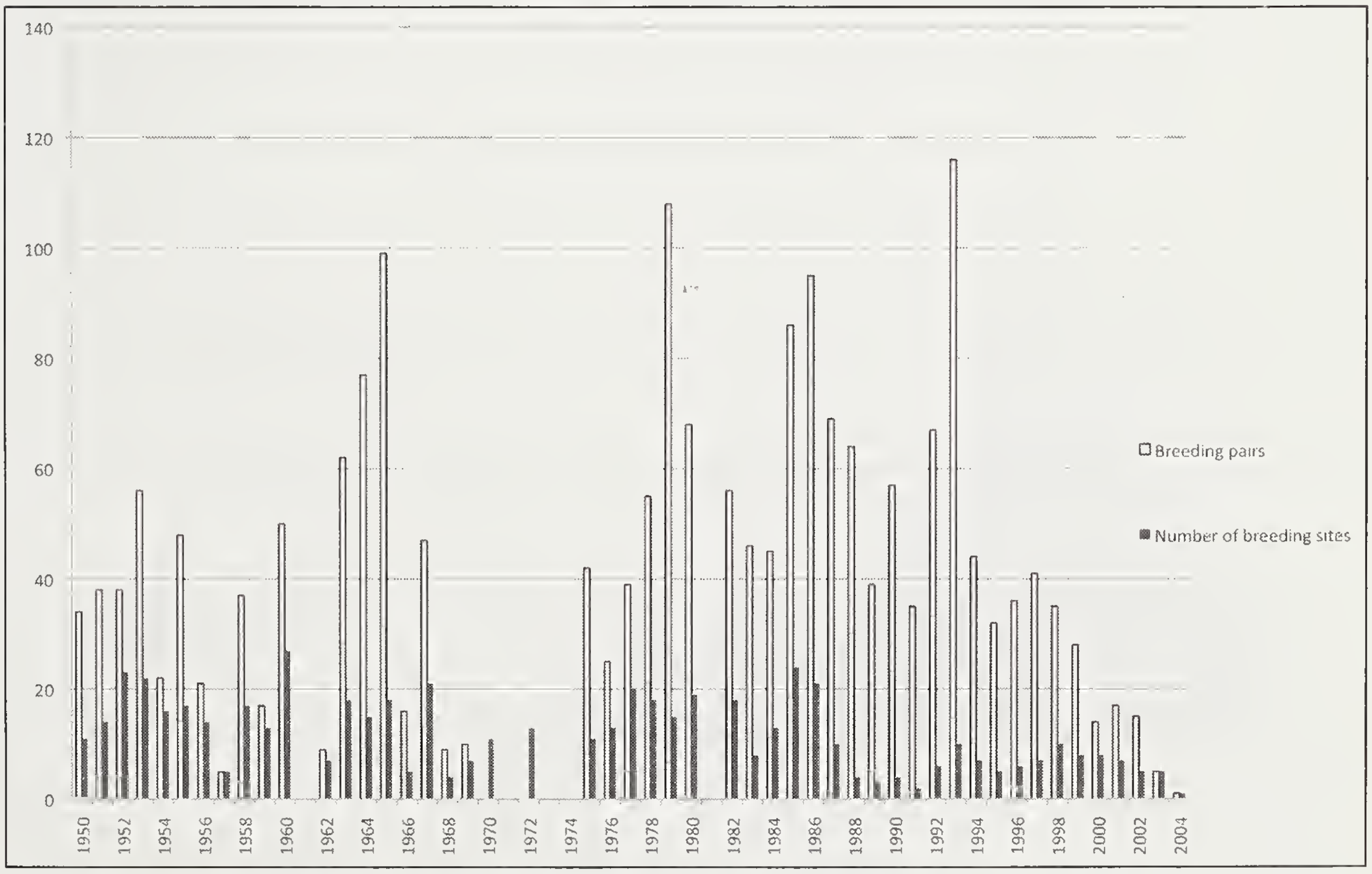

FIGURE 3. Corn bunting — breeding pairs.

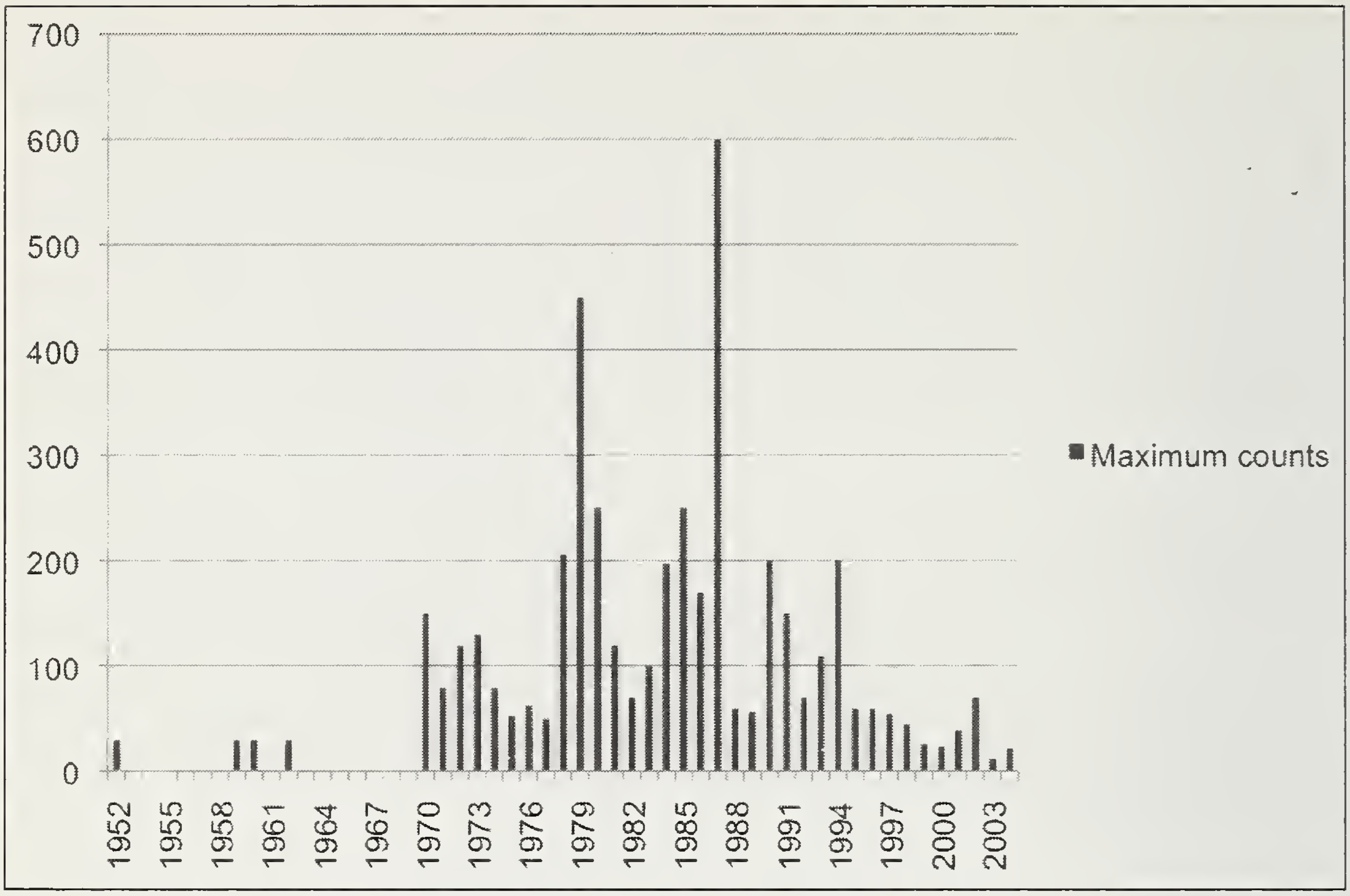

FIGURE 4. Corn Bunting — maximum counts.

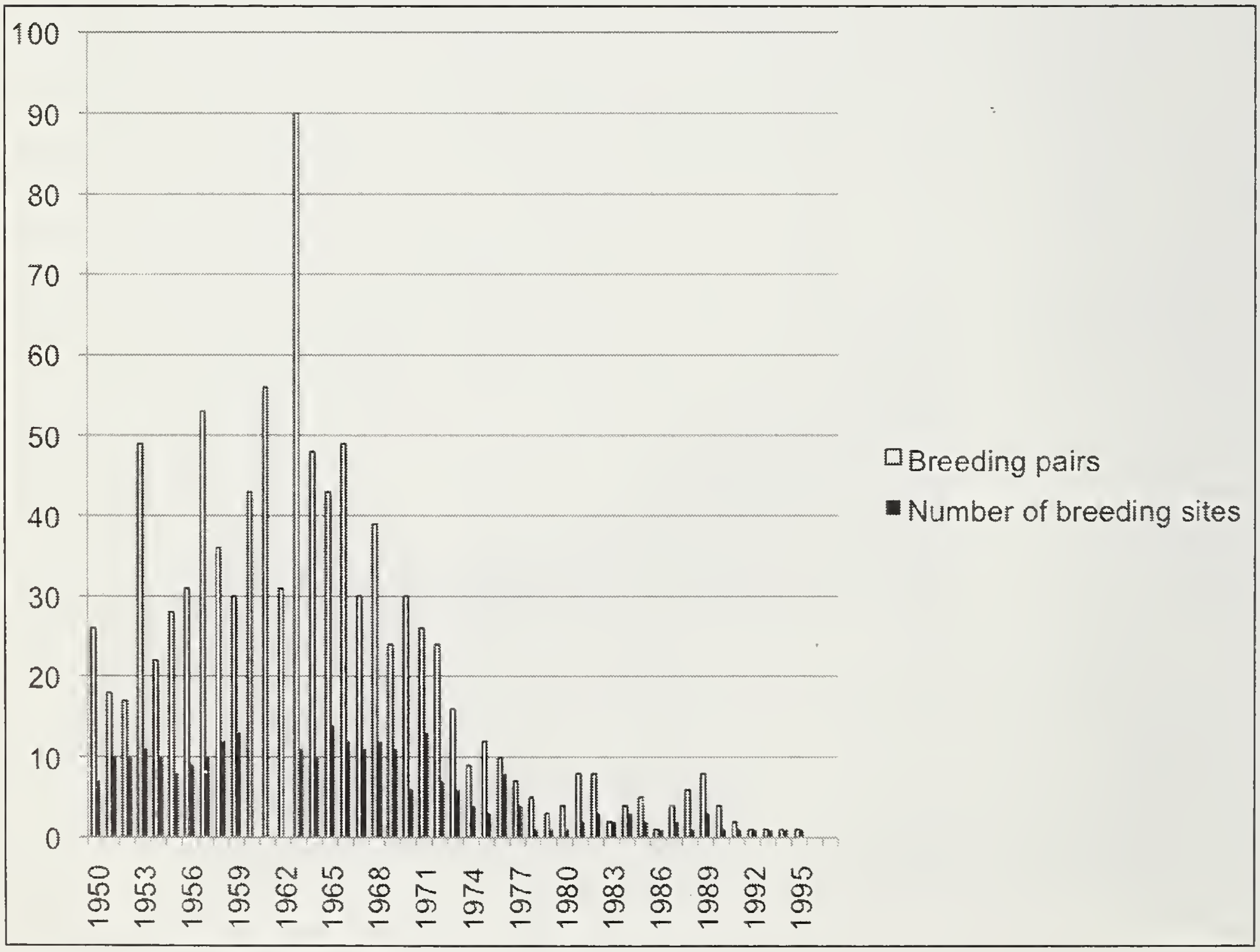

FIGURE 5. Redstart — breeding pairs.

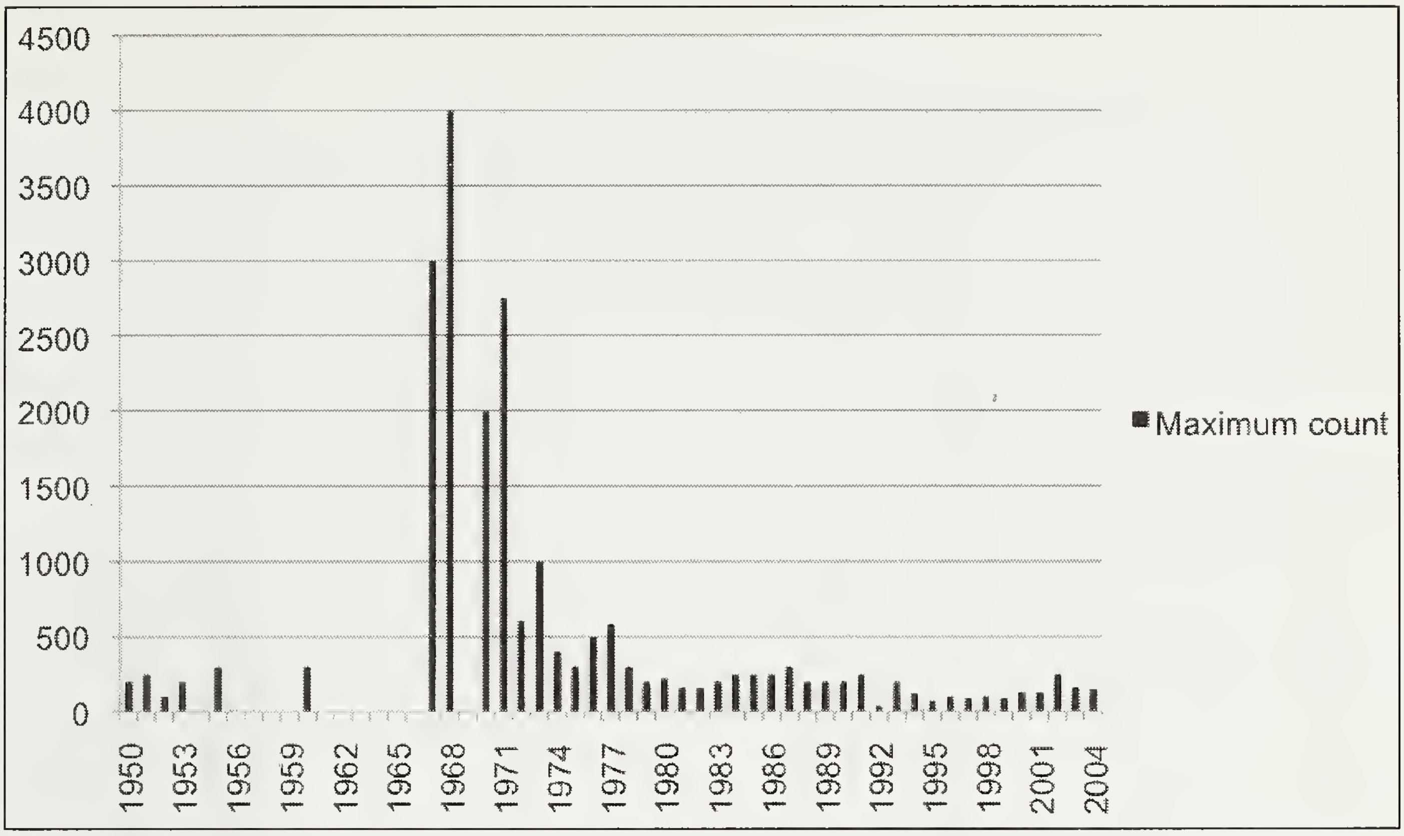

FIGURE 6. Tree sparrow — maximum counts.

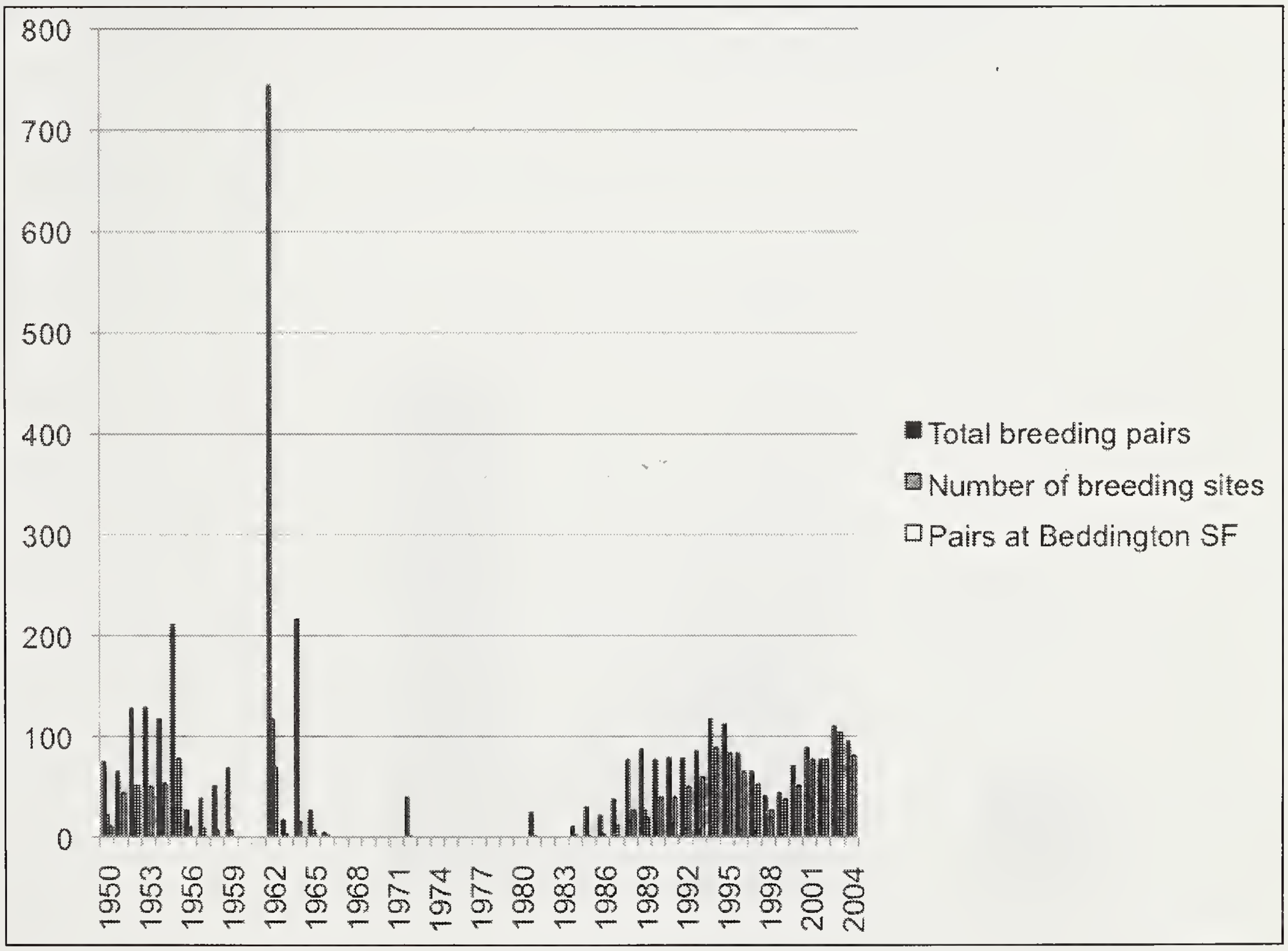

FIGURE 7. Tree sparrow — breeding pairs.

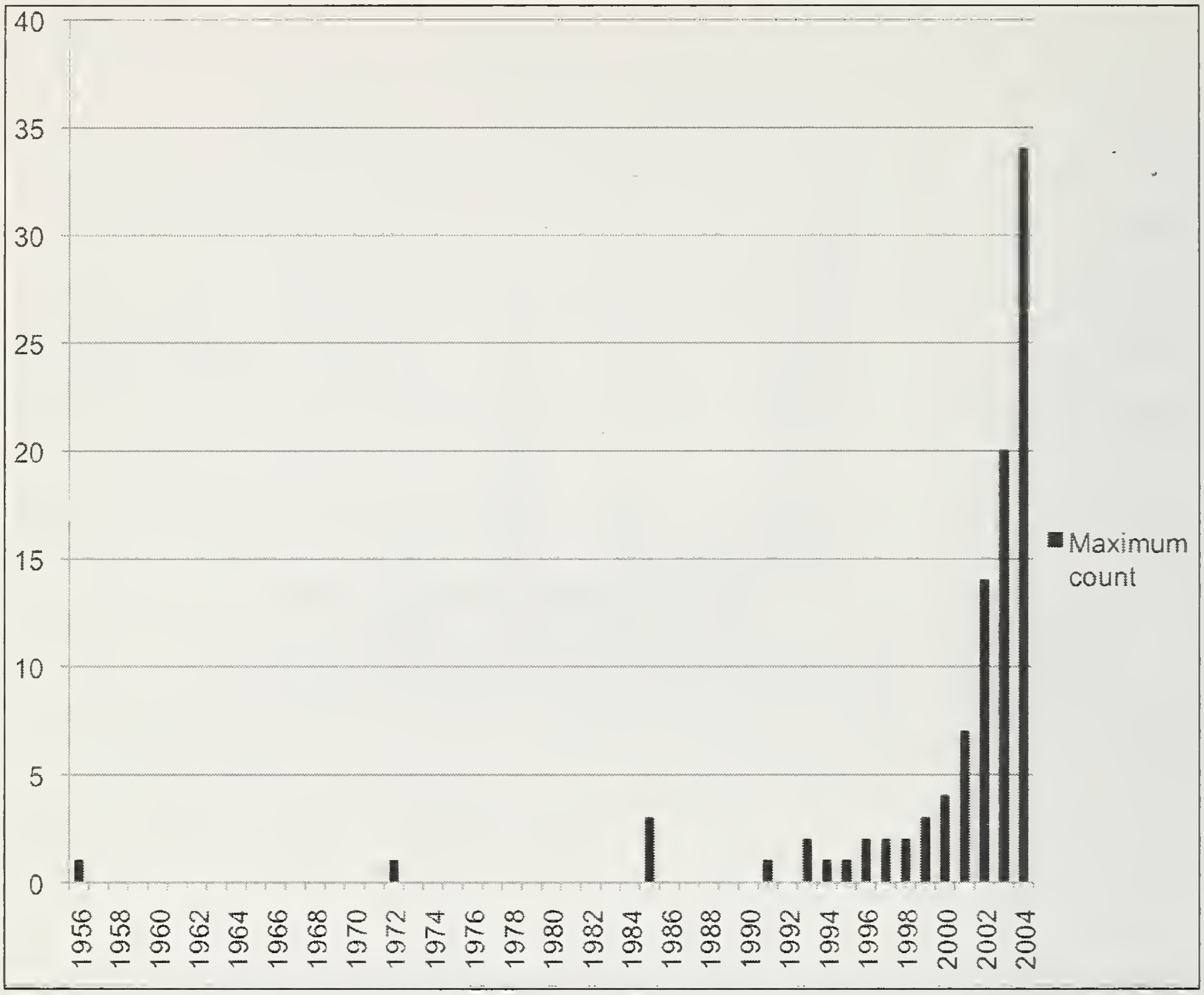

FIGURE 8. Little egret — maximum counts.

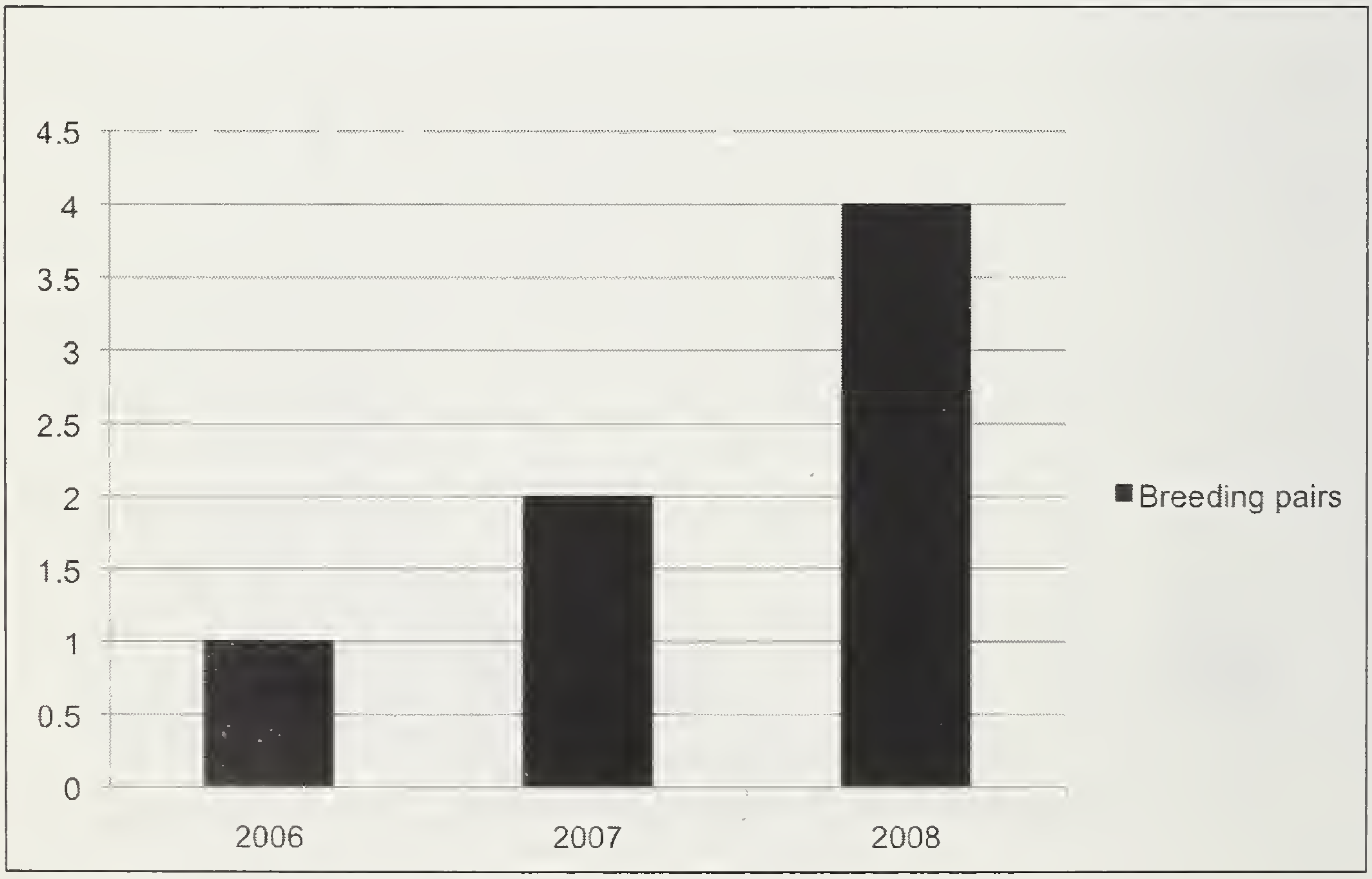

FIGURE 9. Little egret — breeding pairs.

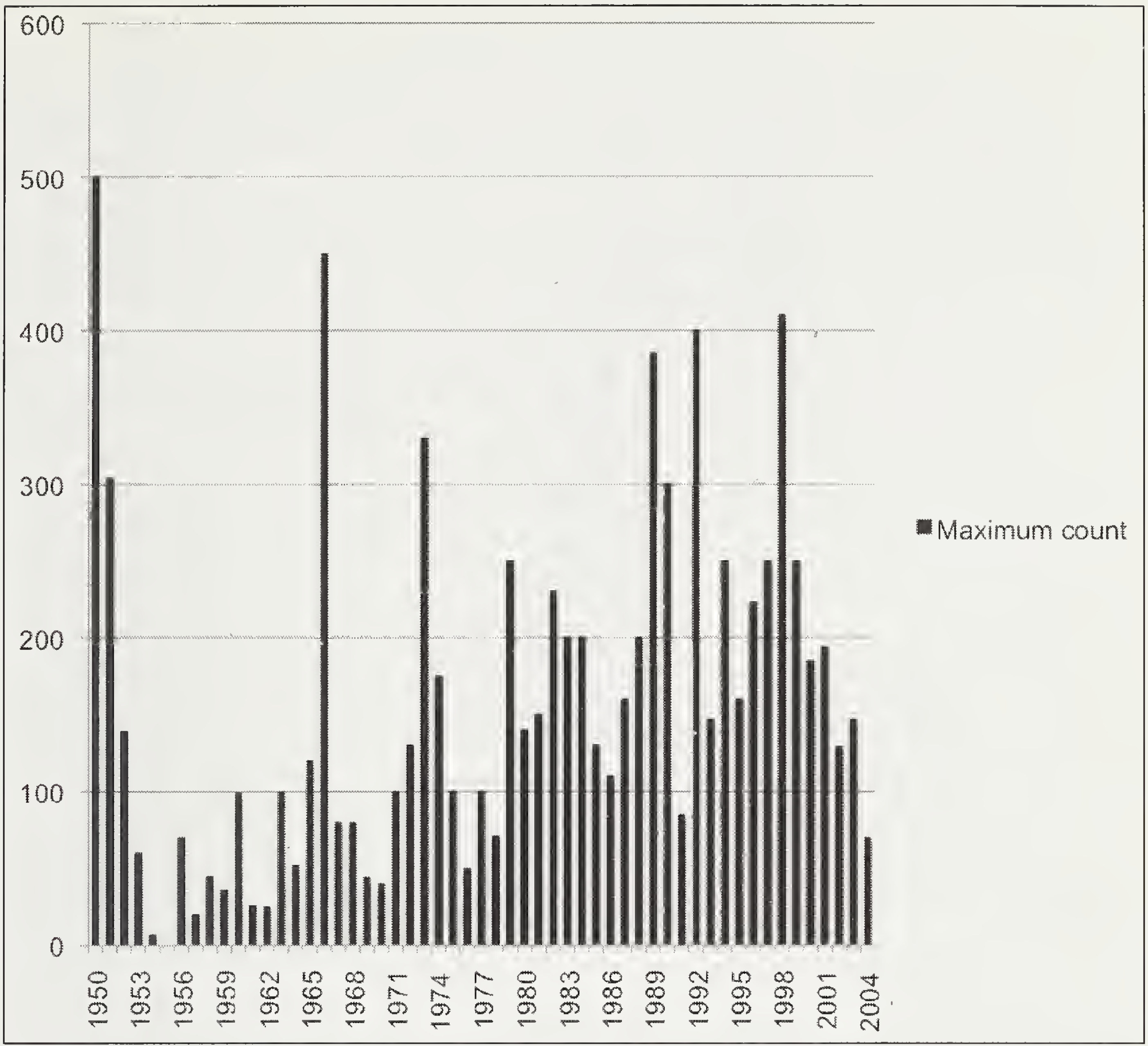

FIGURE 10. Common tern — maximum counts.

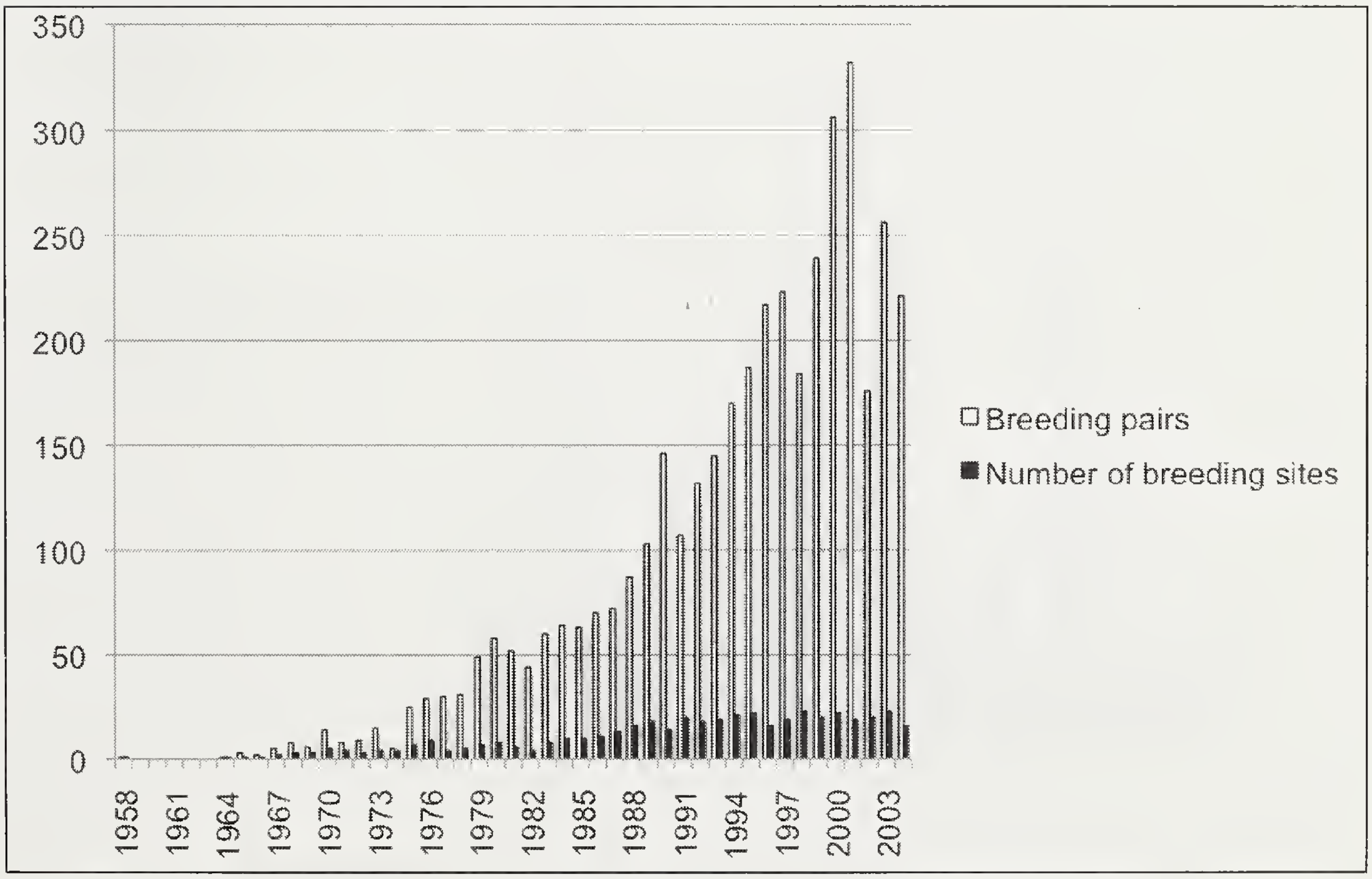

FIGURE 11. Common tern — breeding pairs.

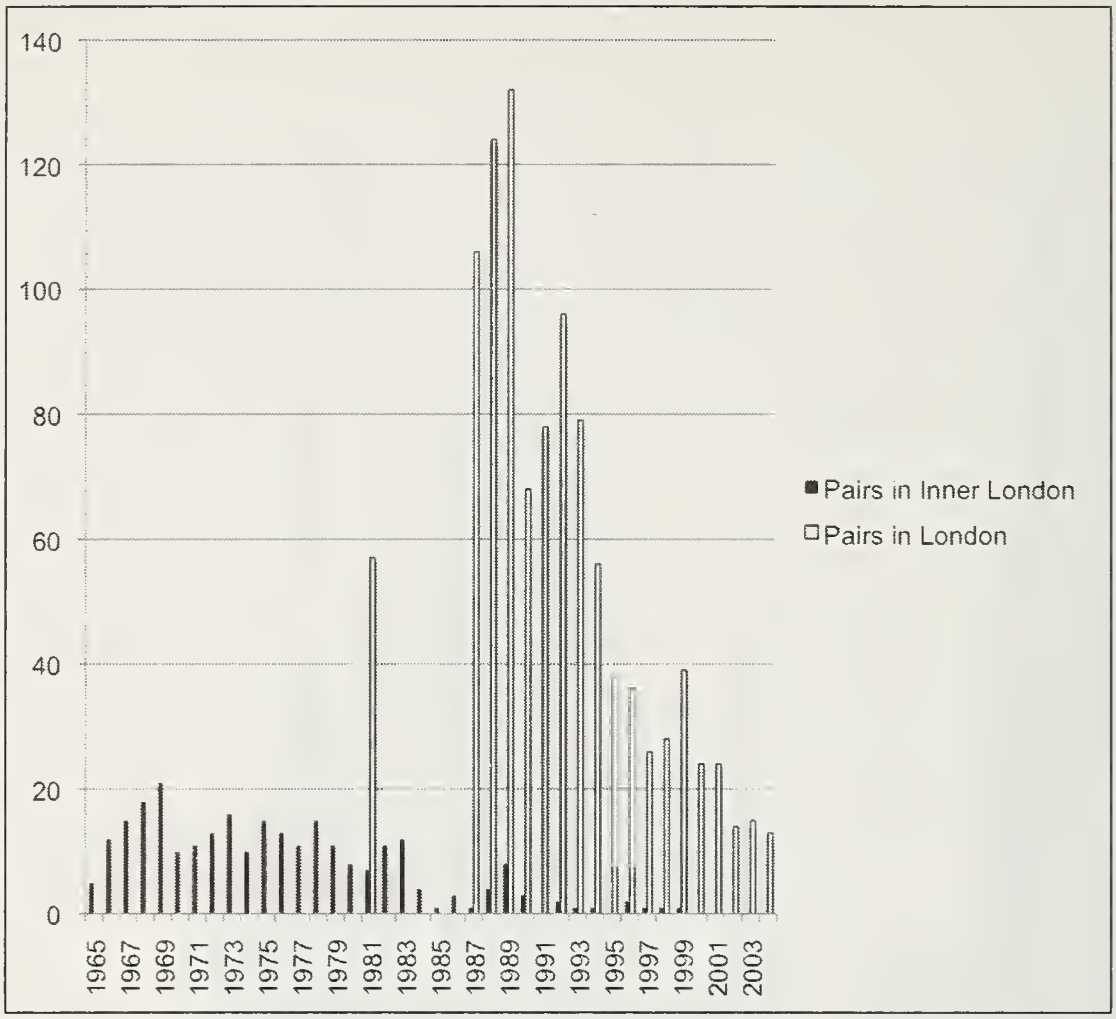

FIGURE 12. Spotted flycatcher — breeding pairs.

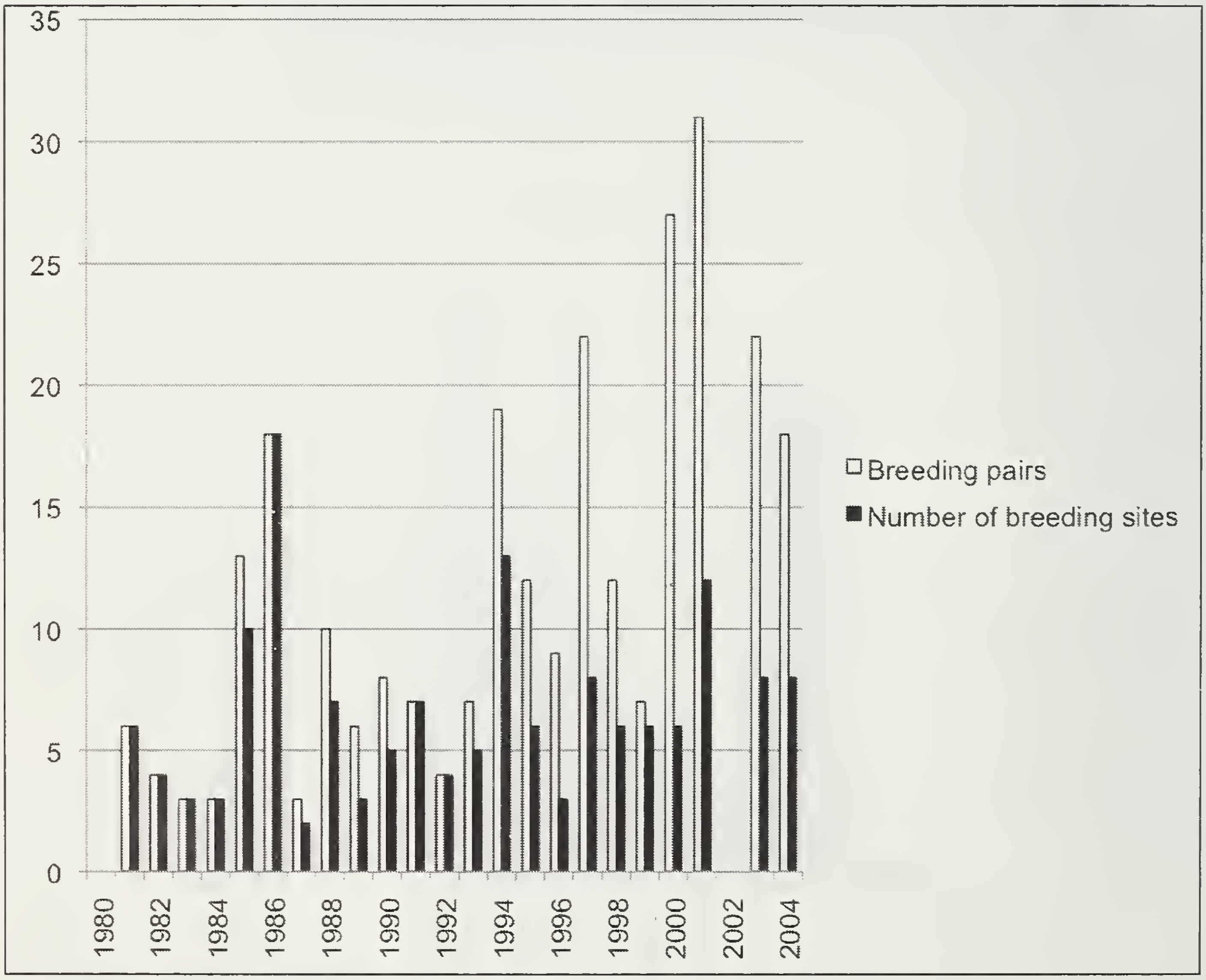

FIGURE 13. Ring-necked parakeet — breeding pairs.

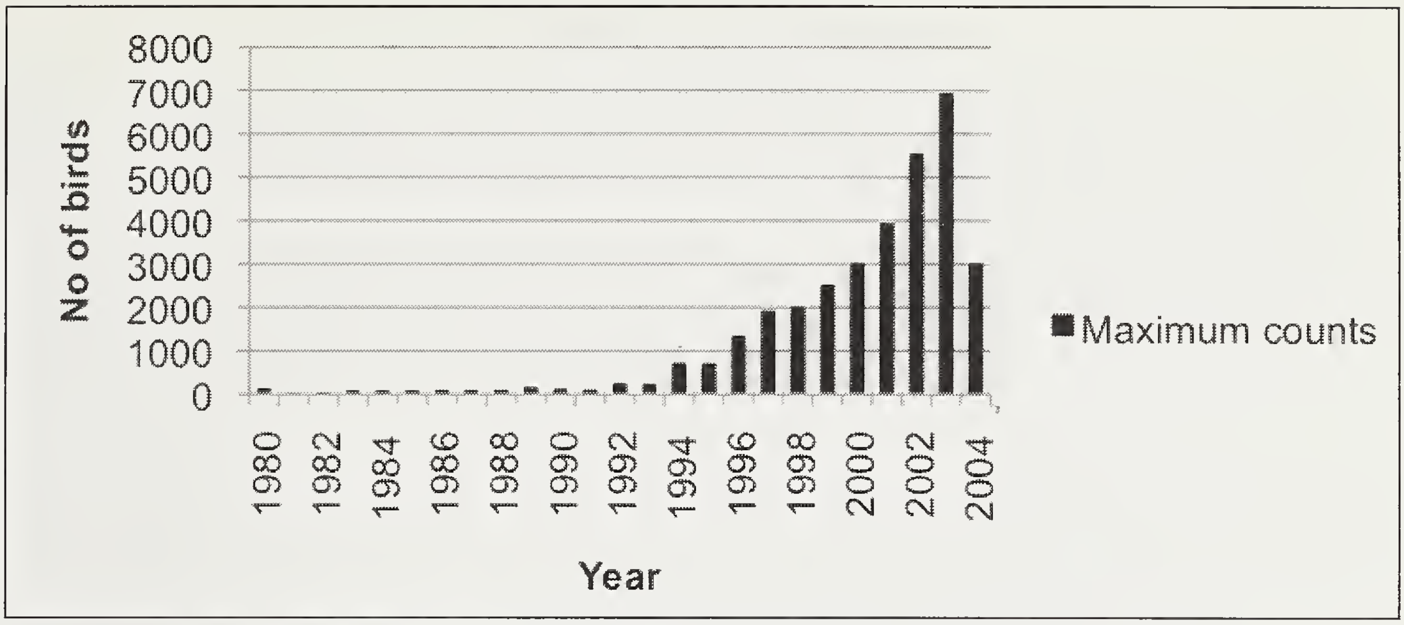

FIGURE 14. Ring-necked parakeet — maximum counts.

Book review

Birds of Surrey. Jeffery J. Wheatley. Surrey Bird Club. 2007. 696 pp., numerous colour paintings, photographs and line drawings. Hardback, £35. ISBN 978 0 901963 08 6.

New county avifaunas continue to come thick and fast. This one deals with the old Vice-County of Surrey (so including parts of Inner London), Spelthorne (that part of Middlesex ceded to Surrey in 1965) and an area around Gatwick ceded to Sussex in 1972. Spelthorne records, which cover west London reservoirs and the former sewage farm at Perry Oaks, are clearly identified in the systematic list. It reviews all available evidence from the fossil record onwards, though the detailed ornithological record does not start until the mid nineteenth century. There is no clear cut-off date. Instead, the author cites the latest dates to which he has been able to consult relevant publications and states that important records have been included down to mid 2007, with the result that it is not always clear how up to date some statements on status are.

There are over a hundred pages of introductory matter including accounts of geology, climate, development of the landscape, conservation, habitats and their birds and more. The author goes into considerable detail, yet at times the treatment seems somewhat out of balance. For instance, in the habitat section, some four pages and several photographs are given over to heathland, yet woodland merits less than half a page and a single photograph. For one of the most wooded counties in England, that is surprising. There is though much of interest in these chapters and it is, for example, fascinating to be reminded of the 5,000 snipe at Beddington Sewage Farm and 850 goosanders at Queen Elizabeth II reservoir in the hard weather of 1962/3.

There follows the systematic list and then a number of appendices giving the Surrey list analysed between the vice-county, Greater London, Spelthorne and so on, hybrids, escapes, other published records ignored in this work (to demonstrate that the records have been actively excluded and not overlooked), references, a list of site and species studies (a good idea), a gazetteer and a species index. The book is adorned by habitat paintings with their characteristic birds, by John Davis, copious well-chosen colour photographs, mainly in the introductory section, and line drawings by John Davis and six other artists. All are of a high quality.

So what of the systematic list? Each species account commences with a description of the species' distribution within and beyond Britain. This is followed by sections dealing with past and recent status, population, migration and so on. The treatment of each species varies considerably, so that even for closely related species, for example chiffchaff and willow warbler, there is inconsistency of treatment. Data on different species may be analysed between different regions within the area covered, so, for instance, there may be reference to the LNHS recording area for one species, but to 'north-east Surrey' (the GLC area within Surrey) for another. This does not make for easy comparisons. Many species have a section on 'where found', though for most, but not all, breeding species this is omitted, there being 1988–92 Breeding Atlas survey maps for all breeding species. Sometimes this section is no more than a list of localities, often without a date, the utility of which must be doubtful. There may then be a 'Calendar' of bird-months, derived from data over varying periods which can extend to a century or more, but sometimes the 'Calendar' specifies bird-days by decade. Other topics covered are diverse and may include 'environmental factors', plumage variation, breeding behaviour, food and even 'Skylark and the arts'. The text includes an enormous amount of detail, frequently in the form of long lists of data and where it involves localities, these are listed alphabetically. This is rarely the most useful sequence; by date, size of count or region would usually have been more helpful. The relevance of the detail of these tables is sometimes doubtful. To take one example, mallard, there is a list of peak counts for each of sixty-two waters, many of which held insignificant numbers; the usefulness of such minutiae is questionable. Rarely is there any attempt to summarize the data or paint a picture of the history of a species in Surrey. It is left to the reader to interpret the mass of detail. The overall result is a lack of the clarity, economy and consistency of presentation of some other county avifaunas. It would have benefited from some rigorous editing. Seemingly it is the work of just a single author. If so, that represents a prodigious effort on his part, but the volume of data behind a county avifauna is now so large that it is not practicable for one person to deal with it effectively. That might lay behind some of my criticisms. Notwithstanding these, the book is an absolutely essential, if at times frustrating, reference for anyone taking a serious interest in Surrey's birds.

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London's mammals

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Abstract

Some mammals have been progressively excluded from London as a result of increasing urbanization, but, paradoxically, others appear to have actively colonized the city and its suburbs. These include the fox and the muntjac deer. Air pollution has resulted in the exclusion of some bat species, although some have returned thanks to clean air legislation. The Thames has allowed access for whales and seals, but the Thames Barrier now limits their movements. However, reduced water pollution may assist in the otter's return.

Introduction

The topic 'urban mammals' is too broad to cover in a brief review, encompassing as it does everything from monkeys in Indian cities to raccoons in America, so this paper focuses on London's mammals. In fact this is not inappropriate, since the whole concept of urban wildlife, urban mammals in particular, came into focus with the detailed studies that began in London in the late 1950s. The LNHS, through its former mammal recorder W. G. ('Bunny') Teagle, was powerfully catalytic in initiating projects in the 1960s that led on to major national schemes to map and enumerate certain species of mammals. The field techniques employed in the London studies have become standard and played a key part in advancing our understanding of mammal distribution at national level. Sadly, Bunny Teagle died in September 2008, but I hope this paper will serve as a brief recognition of the contribution he made to London's natural history and to the careers of at least three significant young mammalogists, gratitude that he would have modestly but vehemently dismissed as misplaced.

The first attempt at a comprehensive inventory of London's mammals was published by Fitter in *The London Naturalist* (Fitter 1949), in which most of the subsequent key papers can also be seen. It comprised a detailed checklist of mammal species based upon newspaper stories, written accounts in early twentieth-century books and also verbal reports. There was no associated fieldwork or attempt at mapping. Fitter documented an impressive thirty-two species living within a twenty-mile radius of St Paul's Cathedral, including ten species of bat well into inner London. For example, he reported two lesser horseshoes *Rhinolophus hipposideros* in the porch of H.G. Wells's house overlooking Regent's Park (in 1926) and also one caught in a butterfly net over the Serpentine in 1939. He noted the continued presence of red squirrels *Sciurus vulgaris* in London's woodland fringe, and drew attention to the uncertain status of the harvest mouse *Micromys minutus* and roe deer *Capreolus capreolus*.

Fitter's work laid the foundation for more systematic surveys, the first of which seems to have been an enquiry by Geoffrey Beven into the distribution of the grey squirrel *Sciurus carolinensis* in the London Area (Beven 1957). He used a twenty-mile radius, based on St Paul's Cathedral, divided (somewhat incongruously!) into 1-km squares. This was the format for subsequent surveys, and Beven appears to have published the first actual map showing the distribution of one of London's mammals. The stimulus for this survey had been a government initiative in 1953 to pay bounties for squirrels killed in an effort to reduce their numbers. However, they had been shot in some of the London parks since the 1930s. Beven recorded their complete absence from the central London area (commenting that one seen in Kensington might have been an escaped pet). Despite Regent's Park being one of the main foci for the introduction of grey squirrels to Britain, the general tenor of Beven's report suggested that their absence from central London was not unexpected and what was interesting was their penetration into the suburbs from the surrounding countryside.

It was at this stage that Bunny Teagle became involved. In the late 1950s he was a civil servant, responsible for reporting annually on the birds in the Royal Parks, and he also took on the voluntary post of LNHS mammal recorder, reporting comprehensively on London's mammals (Teagle 1961*a*, 1964*a*). In addition, he set about systematically studying species of particular interest, concentrating heavily on fieldwork, an aspect not pursued in previous enquiries. These investigations became the inspiration for several subsequent national projects (see below).

Most mammals are small, nocturnal or both. Consequently they often remain unseen, and mapping their distribution is thus much more difficult than it is for birds. The London surveys, led by Bunny Teagle, showed the way and enthused many of his volunteer assistants, myself among them. The application of field sign techniques for recording the presence of mammals when they were not visible in the flesh offered an intriguing challenge, carried forward into the Mammal Society's national distribution surveys that ultimately led to the *Atlas of Mammals in Britain* (Arnold 1993). Training in the use of these techniques was later made available through the Mammal Society's 'Look out for Mammals' project (Sargent and Morris 1997), with some two thousand people receiving their certificate of competence in mammal survey methods during subsequent training weekends.

In 1959, Teagle began a survey of London's foxes *Vulpes vulpes*, using field signs such as earths, droppings and scent as well as direct sightings. In those days, foxes seen in London were widely assumed to be escaped pets, although few people were likely to be keeping such smelly animals in their homes. The survey (Teagle 1967) revealed that foxes were unexpectedly numerous, widespread and well established. They even occurred in the central parts of London, including Trafalgar Square. Subsequently it became clear that foxes were spreading into other British towns, starting in London, but steadily increasing their urban presence throughout the country. Foxes do particularly well in areas where relatively large gardens all back on to each other, creating a varied habitat with many bird tables, plates of pet food and also sheds under which to hide and breed. Urban areas can offer many of the things a fox might need, without the dangers posed by shooters, gamekeepers and fox hunters. London's foxes formed the basis for a PhD study by Stephen Harris, who showed that they subsisted mainly on scavenged material (not necessarily from dustbins as often supposed), wild and pet birds and mammals (including road casualties), earthworms and fruits (Harris 1981). He later transferred to Bristol and subsequently supervised the most extensive investigations of urban foxes in the world.

In 1959, Bunny Teagle initiated an investigation to clarify the status and distribution of the badger *Meles meles* in London, attempting not only to map their occurrence but also explore links with particular habitat features such as slopes, soil type and deciduous woodland (Teagle 1969). He harnessed the efforts of many volunteers, including my school friend Derek Yalden, who were thereby encouraged to pursue badger watching and conduct local badger studies as personal enterprises. The methods and ideas behind this survey formed an important stimulus for the first national badger survey, with Yalden being a co-author of the published results (Clements, Neal and Yalden 1988).

Fitter (1949) had drawn attention to the uncertain status of the harvest mouse in London and believed it had probably died out. However, a few tantalizing records in the 1950s suggested this was not so and another systematic survey was instigated (Teagle 1964*b*). This revealed that harvest mice were not only present well within twenty miles of St Paul's, but that they were mainly associated with the 'stalk zone' of stiff stemmed grasses and 'weeds'. The suggested cause of extinction, previously widely accepted although without foundation, had been the increased efficiency of mechanical reapers in cornfields. Teagle's survey confirmed that this species did not rely on cornfields after all (and why should it when these are reaped every year?). This insight, and his use of nest-based searches, has been important in developing national surveys for this species (Harris 1979), which have recently resulted in the harvest mouse being added to the national Biodiversity Action Plan.

Looking back with the benefit of hindsight, it is clear that the investigation of London's mammals half a century ago formed an important part in the developing interest in British mammals generally, in which the formation of the Mammal Society in 1954 also played a key role.

It is also possible to look back at these developments and identify principles, processes and trends that are probably applicable, with local amendments, to cities across the world. Arguably, the urban environment represents the first new habitat to appear since the evolution of grasslands in the Miocene some twenty million years ago. We tend to view the increasing sprawl of urban habitats with dismay, as wildlife appears to be pushed aside by its advance. Some mammals (including the mole and brown hare) are clearly unsuited to life in streets and tiny gardens and are absent from the central London area, whilst remaining in the outer suburbs. Yet other species, also apparently ill-suited to city life, appear to have invaded London and now prosper here. Bats such as the two pipistrelles *Pipistrellus pipistrellus* and *P. pygmaeus* and serotine *Eptesicus serotinus*, which appreciate the warmth and safety of house roosts, are among them. Perhaps we should view these changes as a natural process of evolution, with animals meeting the challenge of a new environment by adapting or going extinct, just as in any other habitat.

Britain was the first country in the world to have more than half its people living in towns, a state we reached over a century ago. Consequently, there has been time to adapt to this new environment, and the expansion of towns and cities offers fresh opportunities for the wildlife that can take advantage of the new circumstances. For example, cities are several degrees warmer than the surrounding countryside only thirty kilometres distant, favouring temperature-sensitive plants and insects, perhaps benefiting mammals too. City people often put out food for their pets or to attract urban birds, giving mammals potential access to regular food resources that require little foraging effort. The concrete jungle is not a desert and often supports more birds than are found in some types of arable farmland; mammals might also benefit in similar ways. The urban environment is safe from many predators including (formerly) the fox hunting fraternity, and good examples of 'evolution in action' can be seen as animals like the fox adapt to life in urban surroundings.

Conversely, shy and demanding species are usually displaced by increasing urbanization. Dormice *Muscardinus avellanarius* for example, need large areas of particular types of habitat that are not available in cities and this species occurs only in a few sites at the very edge of London. Most deer are too big to live in tiny gardens, although they may raid larger parks and green spaces in the suburbs, to the annoyance of keen gardeners anxious to protect their precious shrubs and flowers. There are also subtle changes in land use that affect our mammals and other wildlife too. For example, Teagle (1961*b*) reported on the mammals found in barn owl *Tyto alba* pellets at Esher, in the south-west of the

London recording area. The owl roost was a hollow tree standing in a large area of rough grassland. This was ideal habitat for the field vole *Microtus agrestis* which comprised 62.5 per cent of the owl's diet by weight. Pellets were again collected from the same roost three years later, by which time the surroundings had become heavily grazed by horses, as 'wasteland' in the suburbs was now too valuable to be left unused. The resultant short-grass habitat is unsuitable for field voles and they now comprised only 32.7 per cent of the owl's diet. At the same time the proportion of bank voles *Myodes glareolus* and wood mice *Apodemus* spp. had risen from 16.2 per cent to 44.3 per cent. Other than indicating a change in relative numbers of small mammals, this may appear a trivial matter. However, field voles live at high densities and are easy for owls to catch by flying over open grassland. They are the principal prey of most British owls and mammalian carnivores. Forcing owls to rely on other species carries a penalty. Bank voles live in bushes where they are much harder to catch. Wood mice are active in more-open habitats, but also much more agile than field voles, so they too are harder to catch. Thus the owl is forced to spend more effort to obtain the same weight of small mammal prey. It can survive, but will be unable to raise young successfully. Soon after the second batch of pellets was collected in 1964, owls ceased to use that roost; a pattern of events that was also observed at two other barn owl roosts near Esher. Similar changes have probably affected owls and small mammals around the whole periphery of London wherever 'horsiculture' has been adopted as a form of land use.

Towards the centre of London the major parks, cemeteries and other open spaces offer refugia for wildlife and can support a reservoir of mammals even in otherwise heavily built-up areas. Adaptable species such as the grey squirrel are then able to spread into the trees in surrounding streets and gardens. For less-mobile species, the parks act as 'terrestrial islands' populated by species that are unlikely to prosper in the surrounding built-up areas. Surveys in Richmond Park for example (Reeve and Jones 1996) confirmed the presence of five small mammal species, two of which (wood mouse and bank vole) might occur in a few nearby gardens, but at least one (the field vole) would not and the two species of shrews *Sorex* spp. would also be unlikely, except perhaps in the nearby larger open spaces of Richmond and Kingston.

Bats also benefit from urban parks. However, they face the problem that urban air is often badly polluted, leading to fewer insects. The restricted range and reduced quantities of vegetation in towns also means that fewer insects find suitable plants on which to lay their eggs and for their larvae to develop successfully. Without successful insect populations there is little food to support urban bats. There are signs of improvement following the Clean Air Act of 1957 and between 1965 and 1980, the late John Hooper visited 222 sites in London and used an early design of bat detector to note the presence of flying bats. This was probably the first systematic survey of its kind in Britain and confirmed the presence of pipistrelles *Pipistrellus* sp. and noctules *Nyctalus* sp. in six of the inner London parks and gardens (Hooper 1981). The London Bat Project (1985–1986), partially funded by the LNHS, achieved wider coverage and mapped bat distribution for the first time across the whole of the London Area. That survey also specifically sought out winter and summer roosts, not just bats feeding in flight, confirming the importance and vulnerability of certain key sites, especially in the old sand and chalk mines of London's periphery. Counting older records, fifteen species of bats have been recorded from the London Area (Herbert 1996), although mostly from the outer regions (sixteen now that 'pipistrelles' are recognized as two species, both confirmed as present in London). However, long-term monitoring suggests fewer Daubenton's bats *Myotis daubentonii* and noctules, at least locally, perhaps balanced by increases in other species (Briggs, Bullock and Tovey 2007). Overall, the London Bat Project registered a 6 per cent decline in numbers and also confirmed a decrease in species richness (Guest, Jones and Tovey 2002).

Often there are corridors of habitat that enable the inward migration of wild mammals enabling them to spread deep into built-up areas from the countryside around. This is a particular value of railway embankments. These often have brambles and rank grasses providing food and cover, and they are fenced off for safety reasons so they are rarely disturbed by people. They enable mice, voles, foxes and many other species to penetrate the suburbs. The muntjac deer *Muntiacus reevesi* is an outstandingly successful example of this principle. It had been successfully moving into the outer fringes of London, Birmingham and other cities for over half a century. But increasingly they turned up in places as heavily urbanized as West Ham, where a newspaper report in 1965 speculated that such an unexpected record must be due to an 'escaped pet' — as though keeping a pet muntjac in east London was more likely than successful natural penetration of suburbia. About that time I saw one inside a rabbit-proof enclosure, inside a walled deer park and another that was caught the following year on Barnes Common (Hammersmith), barely fifteen kilometres from the very centre of London. Since that time, the species has consolidated its position and is now often found in various parts of the London area. Muntjac are well suited to an urban existence, being small and skulking. Even where they occur in large numbers they manage to remain out of sight most of the time. They eat a wide range of plants, so there should be plenty of potential food wherever there are parks, gardens and overgrown patches of wasteland. If the fox can become a successful urban carnivore, then why not an urban herbivore of similar size? The opportunity is there.

The River Thames has provided an access route deep into the centre of London, although the several species of whales and seals that found themselves here could not really be regarded as urban mammals as they either soon died or returned to the sea. The species include a narwhal *Monodon monoceros* — only the fifth British record — and in July 1961 a female lesser rorqual *Balaenoptera acutorostrata* managed to reach Kew (and died). Substantial further movement up river is prevented by Teddington Weir. In more recent times, the Thames Barrier at Woolwich, although not a complete obstruction, must have restricted passage by aquatic mammals and reduced the likelihood of dolphins, porpoises and other small cetaceans being seen in London as often as they once were, despite the river being now much less polluted than in the past. A report in the *Sunday Times* (in December 1999) proclaimed the arrival of the first seals in the Thames for 150 years, the reporter having evidently seen neither Fitter's nor Teagle's reviews in *The London Naturalist*.

Rivers and canals may allow the spread of water voles and otters into built-up areas, and the recovery of the otter *Lutra lutra* from population lows in the 1960s and 1970s has seen them invading many towns, from Edinburgh to Norwich, Canterbury and Cardiff. Recent surveys suggest that otters are now resident in at least a dozen different urban areas, although they have yet to re-establish themselves within London. Nevertheless, they used to be here only fifty years ago and are once again recolonizing the Upper Thames. The river offers both access and refuge, so they may one day be back again, particularly now that fish populations have increased as a result of the reduction in water pollution. Water voles *Arvicola terrestris* also use riparian habitats in towns and cities, but they face the problem that many people then mistake them for rats. Poison put out for rats (which are also often semi-aquatic) will kill these enterprising voles too and risks putting an end to their colonizing activities.

Sometimes mammals are found in towns because suburban expansion engulfed the places where they used to live. This is often the case with badgers, who find themselves surrounded by newly built housing estates. Here the problem they face is not simply one of disturbance, but removal of large areas of land where they can feed on worms and other natural prey. Saving urban badgers is not just a matter of protecting their setts, they need somewhere to feed as well, otherwise they must depend on people feeding them or they have to raid other sources of food, making themselves unpopular in the process.

There is also the possibility of accidental transport into the city. I have seen a live shrew *Sorex aranaeus* scooped up by a bulldozer in a load of dirt, and it could easily have been carried deep into a city by the lorry into which the soil was being loaded. A shrew did turn up in Lambeth Palace gardens, presumably having been imported among a delivery of garden plants. There are also deliberate releases and accidental escapes that lead to free-living mammals in town, at least for a while. These include the giant Indian squirrel *Ratufa indica* that lived in Blackheath for many weeks, a banana mouse *Nyctomys sumichastri* probably accidentally imported with fruit, and various outbreaks of hamsters and gerbils, this time certainly derived from former pets (Lever 1977). Fitter (1949) commented that the common seal *Phoca vitulina* found in the Vale of Heath Pond on Hampstead Heath had 'presumably not got there unaided'.

Deliberate releases have also occurred in an attempt to re-establish species that have been lost. Fitter recorded the release of nine greater horseshoe bats *Rhinolophus ferrumequinum* — a former London species — in the gardens of London Zoo in 1933, a well-intentioned act that would now be regarded as doomed to failure and thus highly irresponsible. In the 1980s, a few red squirrels were released in the same place, based on the principle that they thrive in urban parks elsewhere in Europe (Bertram and Moltu 1986). However, most of these had died (cats, road kills or simply lost) before they had a chance to breed. This high-profile failure probably means that such an attempt will not be repeated.

The environment within buildings is even more challenging than urban streets and gardens. Indoors there is often little food accessible to wild mammals, and central heating creates an atmosphere that is as dry as a desert. Few mammals can tolerate these conditions. Dry air also prevents development of insect larvae, removing an important source of food. Few plants grow indoors either, due to lack of light and water, and modern vacuum cleaners are the last straw. Moreover, within buildings, human antipathy is at its greatest. Few people are willing to share their home or stores with other mammals except pets. Consequently, the species that do manage to live in our buildings, particularly rats and mice, face constant attack from people using traps and poisons to eliminate them. Despite this, brown rats *Rattus norvegicus* and house mice *Mus domesticus* have been extraordinarily successful invaders of our towns, with colonies established even in sewers and cold meat stores. The London Underground is home to colonies of house mice, gorging themselves on the sandwiches, food wrappings and other sustenance dropped by travellers in astonishing quantities. The mice make nests out of the millions of human hairs shed there each week, sometimes obstructing important railway equipment as a result. The mice can drink from water seeping through tunnel walls, and provide interesting entertainment for people waiting indeterminate periods for the arrival of a train. They are nevertheless periodically exterminated.

The black rat *Rattus rattus* has been eliminated from London (and most other places), and its populations are no longer supplemented by fresh arrivals via the docks, as was the case only a few decades ago. In addition, we have also lost the red squirrel, otter and several species of bats. A study of garden use by mammals (Baker and Harris 2007) suggests that future expansion of residential areas is unlikely to be beneficial, owing to the small size of likely gardens, and that continued urban infill and fragmentation of mammal populations pose an increasing threat to the survival of mammals in built-up areas.

In this context, the future looks bleak for the hedgehog *Erinaceus europaeus*, a quintessentially 'garden' animal that was always regarded as common and widespread. This was confirmed by my own survey of its distribution in London (Morris 1966), which showed almost unbroken occurrence throughout much of the south London suburbs, with isolated populations in several of the central London parks. Most of the latter have now gone. Moreover, many of the large houses and gardens of south London have been swept away and replaced by smaller substitutes at higher density. This, and associated urban tidiness in modern gardens, leaves few places for hedgehogs to build their essential winter nests. Modern gardens are small, often with secure fencing that forms a significant barrier to movement, and they are frequently treated with pesticides that reduce the availability of invertebrates for food. Hedgehog populations become smaller and increasingly fragmented into isolated groups, until they are no longer viable. If hedgehogs die out in one part of a town, they are unlikely to recolonize owing to such barriers as fences and major roads, so they are progressively squeezed out of the larger urban areas. Perhaps it is time to repeat the surveys of the 1960s, especially for the hedgehog, to establish the present situation and quantify any change in its status or distribution. We need to draw attention to the fact that one of Britain's most popular mammals is actually in serious decline, not just in London, but in the country at large.

Looking to the future, we might also feel concern for the water shrew *Neomys fodiens*, an elusive species that is nowhere common, and seemingly associated with unpolluted riparian habitats. It was always only a fringe London species, where it was not necessarily found only near water. Nevertheless, it is hard to see how such a thinly distributed species could survive the pressures of increasing urban sprawl eliminating suitable habitat and fragmenting its surviving populations. The yellow-necked mouse *Apodemus flavicollis* is another scarce and patchily distributed species, although numerous in particular places. But where are those places? Who would be able to identify one, and who would even think of looking? The same applies to the water shrew. Perhaps the biggest worry for the future is the apparent lack of concerted effort currently put into studying London's mammals. There is abundant information gathered about birds, yet comparatively little comparable effort is directed at mammals. Maps of the breeding distribution of 120 species of London's birds were published over thirty years ago (Montier 1977), but London's mammals have never been comprehensively mapped at all. Despite the popularity of many mammal species and the enormous increase in wildlife matters generally, they have been conspicuously neglected. The great drive and enthusiasm that was so evident in London of the 1960s appears not to have a modern equivalent. Perhaps we need a new Bunny Teagle?

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Whither London's flora?

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Abstract

Urbanization has created many challenges for native plants as well as opportunities for new arrivals. Recent changes in the composition of our flora indicate that the future will hold challenges for all. How do we effectively monitor these changes?

Maianthemum bifolium May lily is long gone from the London area. This species, first recorded from Ken Wood, Hampstead Heath in 1813 was last seen there in the early twentieth century. However, Burton in his *Flora of the London Area* (1983: 170) has cast doubt upon its native status. Other plants with a stronger claim to being native in the London area that are now extinct include *Pinguicula vulgaris* common butterwort and *Schoenoplectus triqueter* triangular clubrush.

Since the publication of the *Flora of the London Area* many of the scarcer native plants have continued their decline. The population of *Sonchus palustris* marsh sow-thistle near the confluence of the Cray and Darent was described by Burton (1983:161) as being a 'substantial clump' that 'spreads over about 20 yards'. Sadly, this is no longer the case and the colony is in imminent danger of extinction due to adverse management and habitat degradation. I differ in my opinion from Rodney Burton regarding the colony's origin and believe that the Cray site may represent a long-missed remnant of the now extinct population that was found scattered in suitable habitat either side of the Thames from Greenwich to Rainham. In the *Flora*, he suggests it 'must have come as a blown seed from some other well established population, of which the nearest is by the Medway about 30 km distant'. I believe it unlikely that this could have happened, as the seed would have had to travel against the prevailing wind for a long distance. Marsh sow-thistle, although a large and distinctive plant is often confused with *Sonchus arvensis* corn sow-thistle or is overlooked, as was probably the case in Hampshire (Brewis, Bowman and Rose 1996: 232). Burton stated that the plant was last reported from the London Area in 1885; however, after some searching in the British Herbarium at the Natural History Museum, I located a specimen collected by F.J. Hanbury from Woolwich in 1893. This brings the known survival date of the London population slightly closer to the time the Cray plant(s) were discovered in 1963. It seems to me that the Cray colony is long established and has gradually dwindled since its discovery.

Other native species, albeit the minority, appear to be bucking the trend and have increased in recent years. *Ophrys apifera* bee orchid (Figure 1) appears to have colonized various sites in London recently. This trend has also been noted at a national level and is discussed by Braithwaite, Ellis and Preston (2006: 119). Although the recent spread of bee orchid has certainly not purposefully been aided by man the same cannot be said of *Orobanche hederacea* ivy broomrape. Several of the recently discovered sites in the London area are certainly attributable to purposeful introduction; others are more unlikely and probably reflect natural expansion from nearby native populations, such as a very large population in Staines.

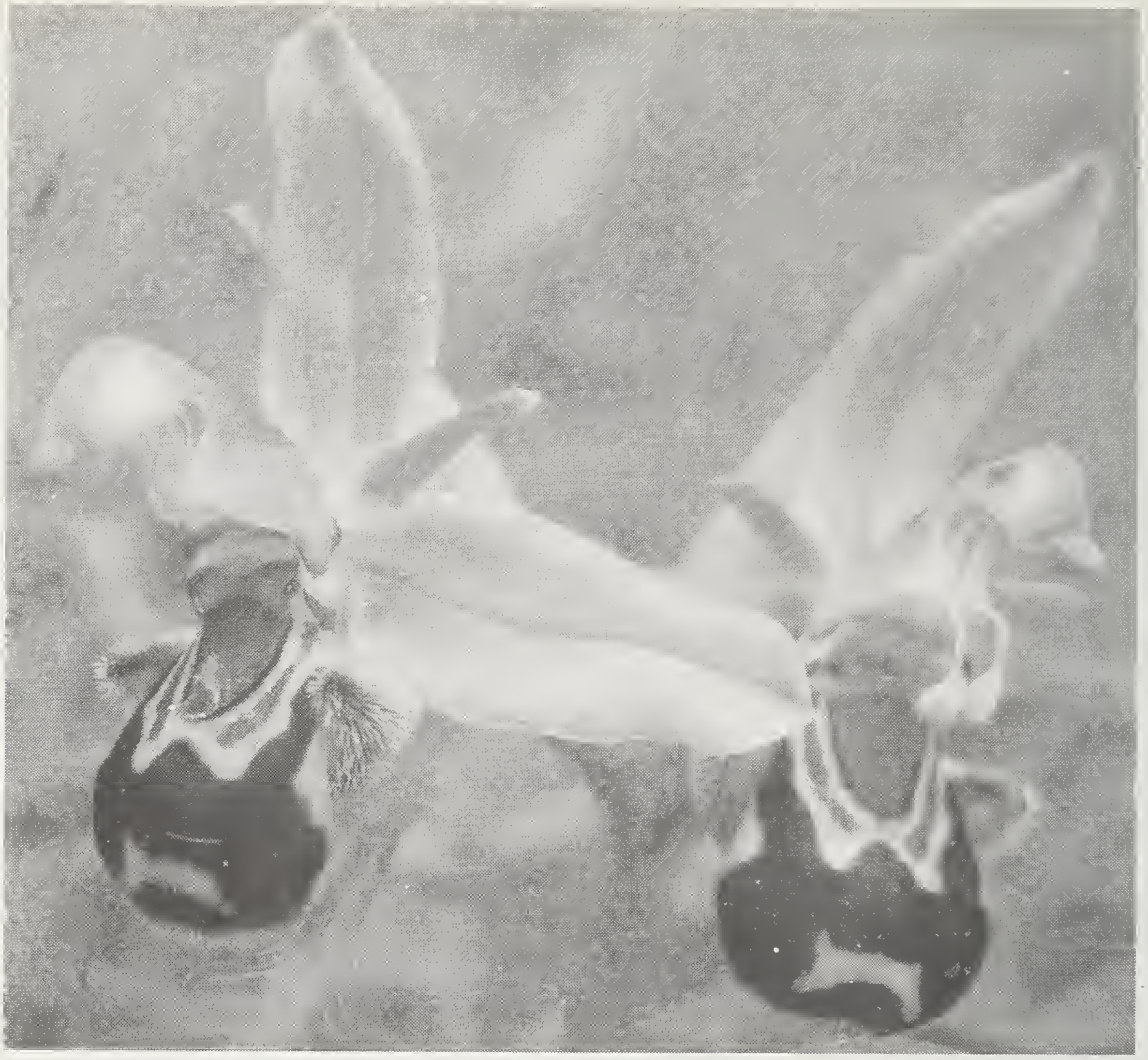

FIGURE 1. Bee orchid – *Ophrys apifera.*

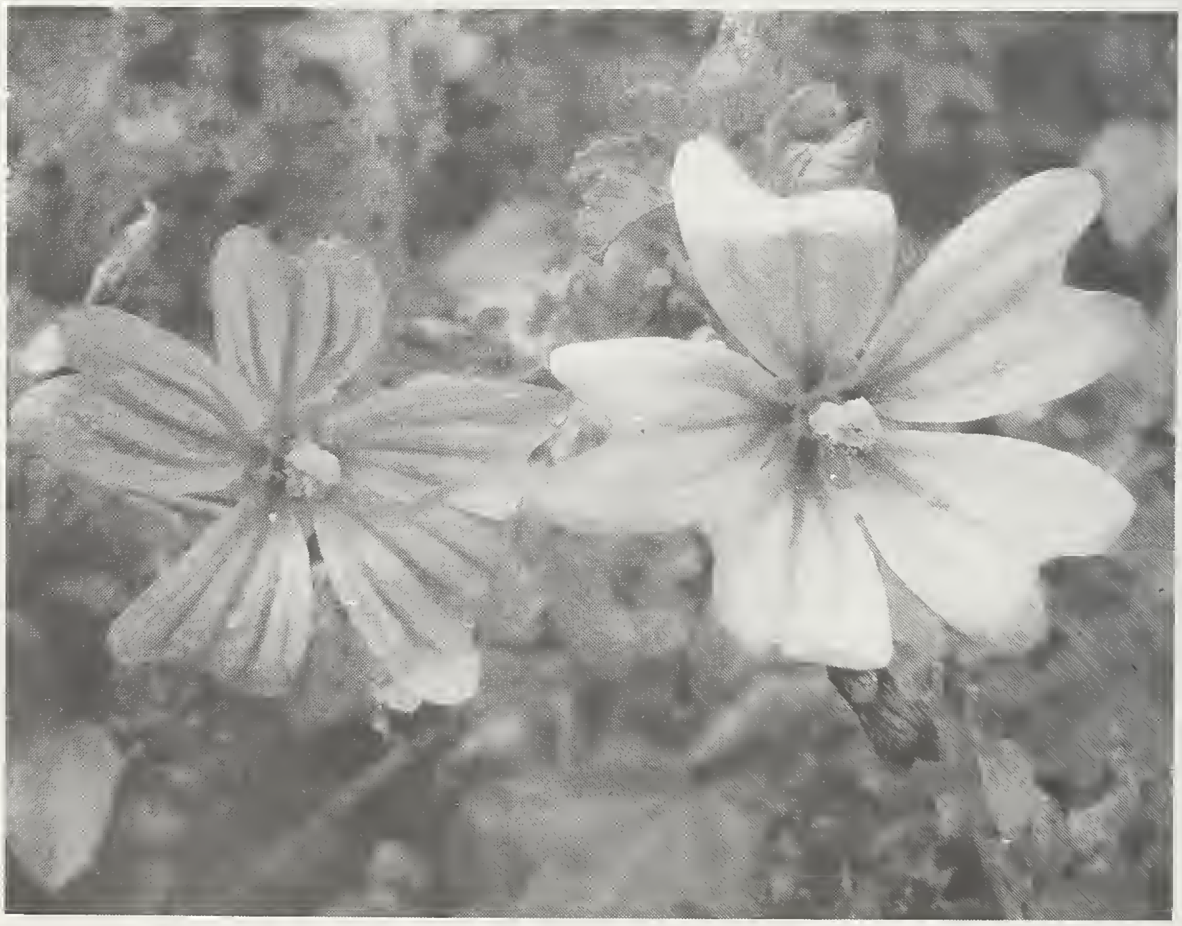

FIGURE 2. Common mallow *Malva sylvestris* (left), *Malva* × *decipiens* (*sylvestris* × *neglecta*) (right).

The publication of the second edition of *Hybridization and the flora of the British Isles* (Stace 1975) detailing advances in this important and often neglected aspect of field botany is eagerly awaited, certainly by me. One small but significant contribution to this book was the discovery of *Malva* × *decipiens* (*sylvestris* × *neglecta*) (Figure 2) in 2007. This is the first known occurrence of *M.* × *decipiens* in the British Isles, although it has been recorded from the Continent (Spencer 2008: 184).

Hybrids are certainly overlooked. Another group of plants that may pass the eye of some are grasses, especially small ones. *Poa infirma* early meadow-grass certainly fits that description, it is generally a smaller and paler version of its close relative *Poa annua* annual meadow-grass, one of the most widely distributed and successful plants on the planet. Returning briefly to the theme of hybridization, annual meadow grass is almost certainly an allotetraploid species derived from the hybrid between early meadow grass and *Poa supina* (Darmency and Gasquez 1997). *P. supina* is a European native apparently not accepted as a British plant (Clement 2005). Early meadow grass is accepted as a native that, prior to 1969 was largely restricted to the Lizard peninsula and Isles of Scilly in Cornwall. Since then it has spread rapidly in southern England and was first noted in the London area in 2004 almost simultaneously by David Bevan and myself. This change in range is beautifully illustrated by the BSBI's online mapping scheme (http://www.bsbi.org.uk/). What remains unclear is how much of this change is directly mediated by human activity, such as road transport and horticulture (many of the sites are adjacent to trunk roads or recent municipal plantings) and how much is attributable to climate change.

Recent upward shifts in average temperatures in London are definitely changing the range of plants that horticulturists are able to grow all year long outside. *Bourgainvillea glabra* bourgainvillea and *Persea americana* avocado are among many exotic non-native plants that are now thriving. Indeed the latter successfully fruited in Chelsea in 2006 and reports of various citrus trees bearing fruit are becoming commonplace.

Discussion of non-native plants often leads towards concerns about invasive species; much of this debate becomes immoderate and talk of racism frequently bubbles to the surface, especially when natural historians and scientists communicate these important issues to society as a whole. It is important to remember that not all non-natives have invasive potential and indeed many natives are increasingly problematic (see http://www.bsbi.org.uk/html/alien_invaders_.html for further information). Therefore, what characterizes an invasive species? The Invasive Species Specialist Group of the IUCN define them as '. . . organisms (usually transported by humans) which successfully establish themselves in, and then overcome, otherwise intact, pre-existing native ecosystems.' (http://www.issg.org/). Following that definition, under certain circumstances, the following natives can be considered invasive: nettles, brambles and hawthorn; as can the following non-natives: buddleia, rhododendron and Hottentot fig.

Sisymbrium irio London rocket is a non-native with a very long and well-documented history in the British Isles (Swindells 2007). Apart from its dramatic burst into prominence around London following the Great Fire of 1666 it has always been rather scarce and sometimes considered extinct. Recently, there appears to have been a resurgence of numbers and an increase in sites. Some variation in flower colour between populations would seem to indicate that some of this expansion may have been achieved by fresh material entering the London area in recent years, thus augmenting the established populations (Spencer 2008: 180). Currently, London botanists view this plant as a welcome and interesting component to our flora. However, this may not remain the case. London rocket is an invasive non-native weed in the SW United States in particular; as our climate changes it may become a problem here too.

Our perceptions and prejudices impact everything, including natural history; people (natural historians and scientists included) tend to view matters of concern such as invasive species from a very personal perspective. I am rather well known for my animosity towards *Buddleja davidii* (sometimes ludicrously referred to as the butterfly-bush!). Temporarily putting that to one side, let us consider why buddleia is often considered 'good' and that other well-known non-native *Fallopia japonica* Japanese knotweed is condemned as 'bad' for wildlife. Society is often advised that buddleia is good because it attracts butterflies and some other insects and that Japanese knotweed is bad because it pushes over walls and butterflies are not attracted to it. Admittedly, what I have just stated is rather glib but perhaps we should consider both plants similarly. After several years of searching, I have found no scientifically published data that supports the contention that buddleia is good for pierid and nymphalid butterfly populations. Although Gibson (1998: 4) commented that the mullein moth *Cucullia verbasci* feeds on buddleia (incidentally, this adds further support to the inclusion of *Buddleja* within the figwort family, to which mullein belongs) and that two hoverflies, *Volucella inanis* and *V. zonaria*, utilize buddleia scrub. Both Japanese knotweed and buddleia are certainly invasive; what is needed, is a consistent approach to assessing the potential impact of biological invasions in the London area.

It should be remembered that not all non-natives are invasive. Plants such as *Vicia villosa* fodder vetch (Figure 3), *Medicago sativa* ssp. *varia* sand lucerne (Figure 4), *Erigeron karvinskianus* Mexican fleabane (Figure 5) and *Acer pseudoplatanus* sycamore are generally considered to be non-problematic; although sycamore has long been a bone of contention amongst conservationists in this respect. It has also been noted by some that many native plants are becoming invasive, particularly those tolerating elevated levels of soil nutrients (Pearman 2004).

What does the future hold for London's flora? Already, there is strong anecdotal evidence that some plant species are going through significant shifts in their distribution and abundance. *Ailanthus altissima* tree-of-heaven, a plant that been with us for a very long time, has recently started to produce large quantities of seedlings; these were relatively scarce twenty years ago, now they are abundant. Tree-of-heaven is becoming a frequent and locally dominant component of the flora of inner London. This is a matter of great concern as it is an invasive species in other parts of the world and has serious consequences for biodiversity and flood management (a recent search on Google, using the terms 'Tree-of-Heaven' and 'invasive' resulted in 28,900 hits). More recently, *Catalpa bignonioides* Indian bean tree and *Paulownia tomentosa* foxglove tree have also started regenerating by seed; the latter in particular has become invasive in some warm-temperate regions of the world, particularly the southern United States.

Various non-native grasses, such as the long established *Polypogon viridis* water bent and the predominantly warm-temperate or tropical genera *Sorghum*, *Setaria*, *Echinochloa* and *Digitaria* are also increasing. Interestingly, some of these plants probably 'fix' carbon dioxide using the C_4 carbon fixation mechanism during photosynthesis. In environments with high sunlight levels, C_4 plants can have an adaptive advantage over C_3 plants (the widespread mechanism found in most plants). We may find that London's environment is beginning, in some circumstances, to favour non-native grass species with a C_4 carbon fixation mechanism over native ones that are C_3. This is an area of plant biology requiring further investigation; the C_4 mechanism is widespread in many tropical grasses, but its presence is still not confirmed in many, including species found in the London area.

Sell (2007) has commented that many plantings by local authorities and some conservation organizations are often of non-native material. These so-called, by me, 'pseudo-natives' fall into two camps: first, non-native genotypes

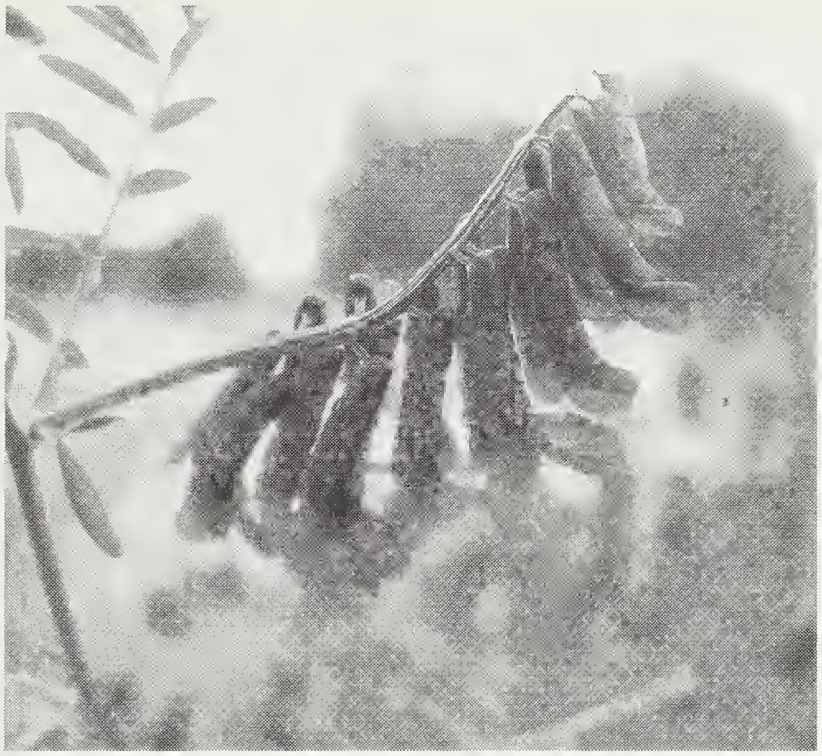

FIGURE 3. Fodder vetch – *Vicia villosa.*

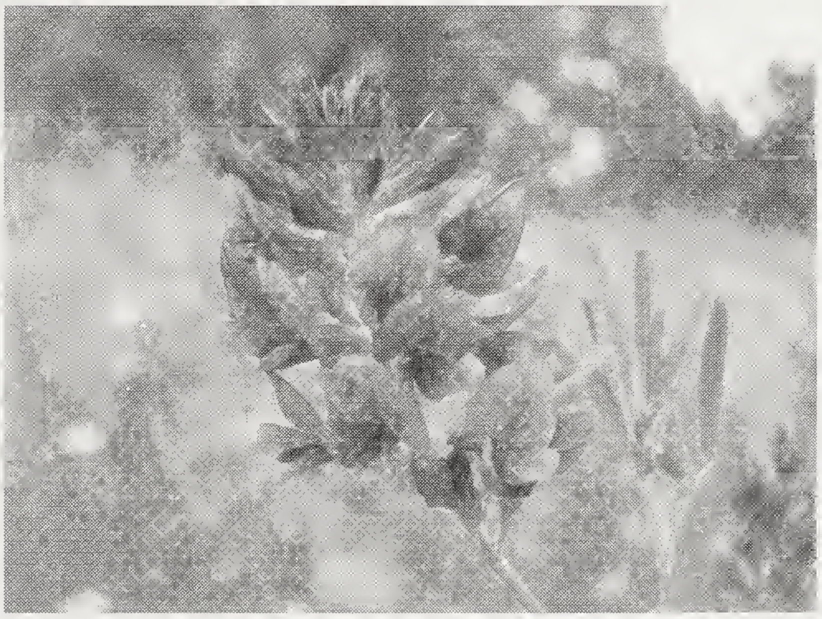

FIGURE 4. Sand lucerne – *Medicago sativa* ssp. *varia.*

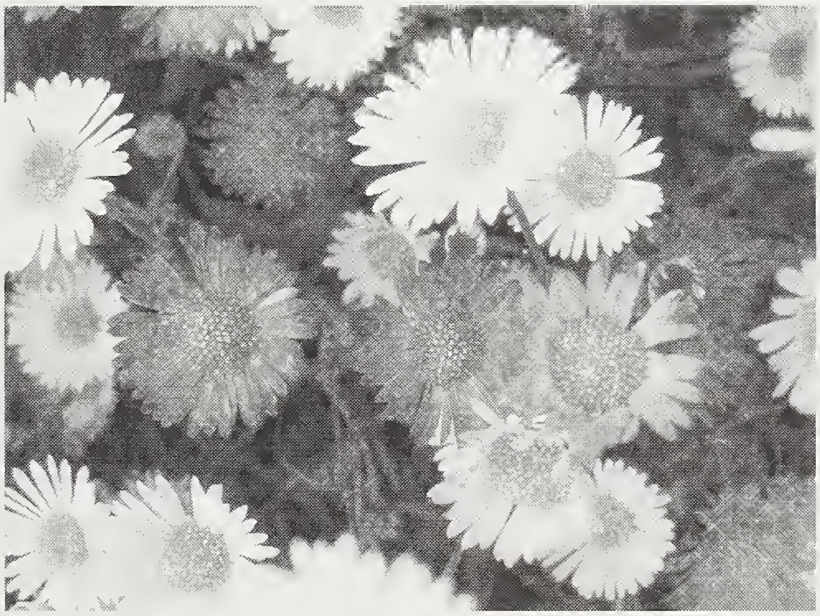

FIGURE 5. Mexican fleabane – *Erigeron karvinskianus.*

of native species such as central European stock of *Crataegus monogyna* hawthorn and secondly, non-native species such as *Viburnum sargentii* (China) and *V. trilobum* (N. America) being inadvertently planted instead of *Viburnum opulus* guelder-rose. Potentially, there are many impacts arising from such activities, I will only mention one; in recent years phenological data have become increasingly important for understanding the effects of climate change. Central European hawthorn plants have adapted to different environmental conditions and tend to have different flowering times to the native stock. The merging of non-native/native flowering time data may have profound impacts upon resultant analyses and alter our understanding of these important issues.

Walls are one habitat that London has an abundance of, although many are scraped clean far too vigorously as far as botanists are concerned! Various people have noted the recent recolonization of London's walls by native ferns, particularly *Asplenium* species. Alongside those plants, non-native ferns have also advanced, such as *Cyrtomium* spp. holly-ferns and several members of the large warm-temperate or tropical genus *Pteris*.

The aquatic environment in London has been impacted by a variety of non-natives; such as *Lemna minuta* least duckweed, a widespread native of the Americas that first appeared in the British Isles in 1977. It is now abundant in the London area and often reaches epidemic proportions. At Camley Street Natural Park a few years ago it grew so thickly on the surface of the water that Canada geese could barely swim through it. Very soon after that the population crashed and now the plant survives in Camley Street at very low density. A similar situation occurred during the 1990s with *Azolla filiculodes* water-fern, which, however failed to recover and has now gone from the site.

It is evident, from the suite of examples touched upon above, that London's flora is going through rapid change and that the majority of that change seems to be focussed upon the non-native flora. Many of these species have had little or no adverse impact, but a significant minority do, and will continue to. It is also important to remember that '*The introduction of alien species is interacting with habitat destruction and degradation, over exploitation of plants and animals in natural ecosystems, and global climatic change to create an evolutionary revolution*' (Cox 2004). Many of these changes will alter the flora of London for ever.

So, how are non-natives arriving and establishing in London. Currently, horticulture is providing a ready access route for many species. The recent vogue for 'tropical' plantings has resulted in the mass importation of a wide range of plants, particularly palms, tree ferns and mature olive trees. Many of these are being imported from abroad, especially Italy. Several plant species found either as casuals or as small, established populations in recent years appear to have been introduced in this manner. These include *Fumaria capreolata* ssp. *capreolata* white ramping-fumitory (Figure 6): the closely related native ssp. *babingtonii* has not been recorded in Greater London, *Urtica membranacea* membranous nettle (Figure 7) and, probably, *Polycarpon tetraphyllum* four-leaved all-seed: restricted as a native to a few localities in SW England. As mentioned earlier, non-native forms of native plants are frequently planted by local authorities. The flowers of the native *Iris foetidissima* stinking iris (Figure 8) are predominantly a rather dingy purplish colour. Increasingly in London and other areas, plants with yellowish coloration are found; these are probably best referable to the var. *citrina* and their origins are often uncertain.

Habitat creation and landscaping schemes implemented by local authorities and some conservation organizations frequently utilize non-natives. The enthusiasm for 'wild-flower meadows' often results in the appearance of some archaeophyte arable weeds such as *Agrostemma githago* corncockle (Figure 9) and *Centaurea cyanus* cornflower in urban areas; these plants have little in common with the corncockle and cornflower populations that once inhabited our arable landscape. Although the unwary may be briefly tricked into thinking they have stumbled across a long-lost population of these treasures, the presence of the

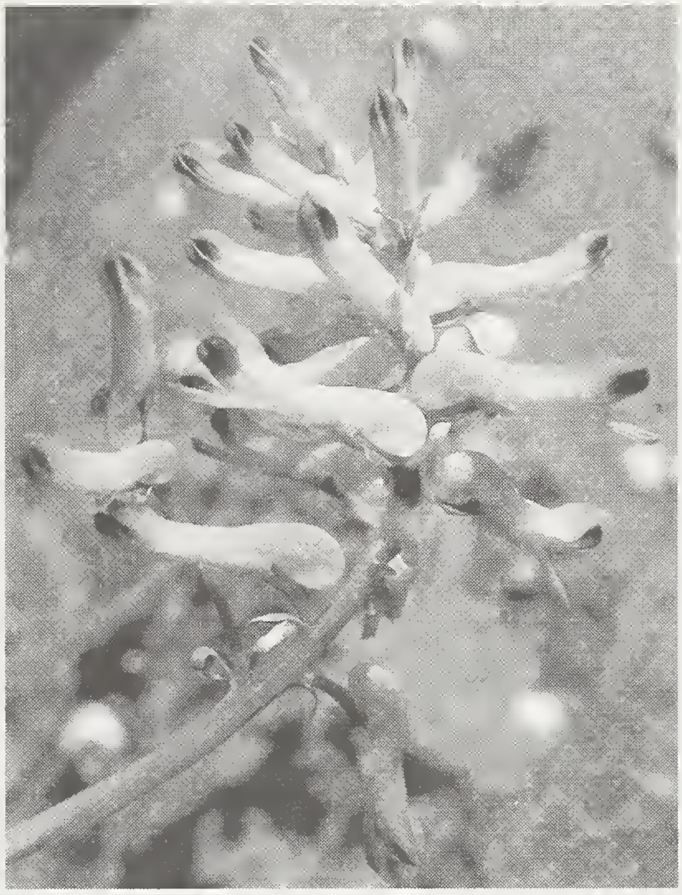

FIGURE 6. White ramping-fumitory – *Fumaria capreolata* ssp. *capreolata.*

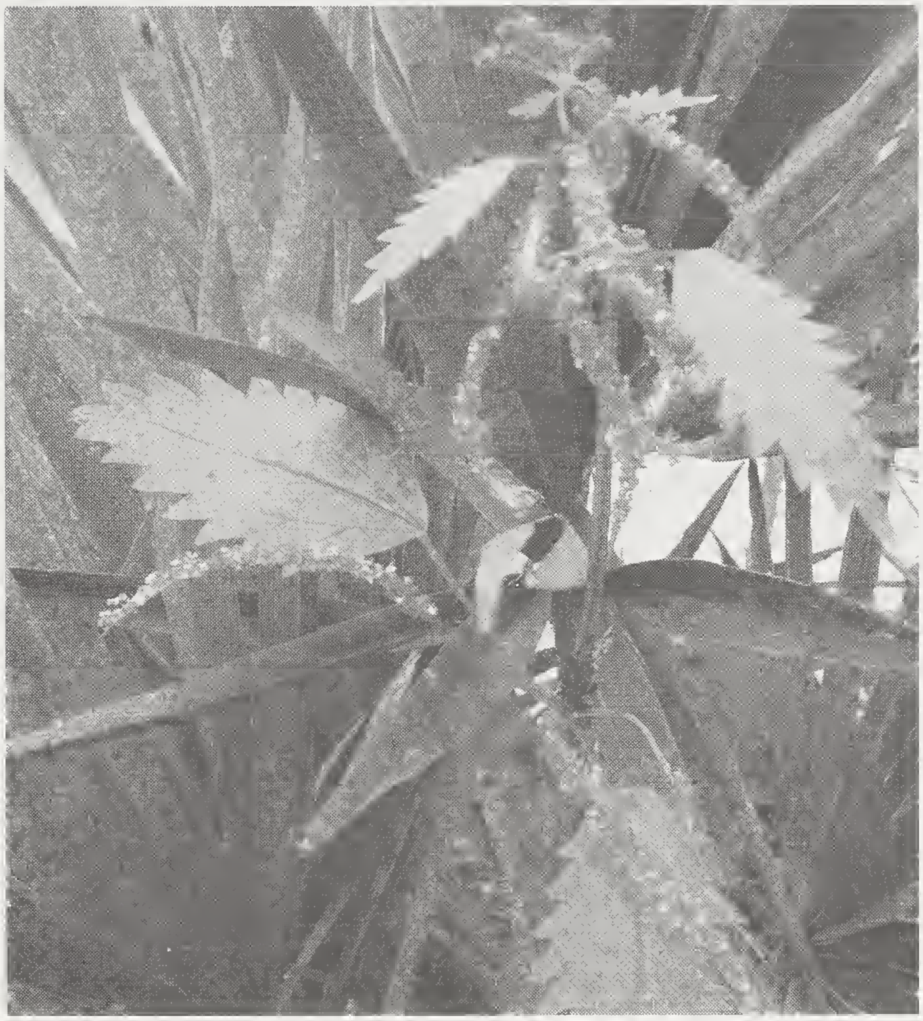

FIGURE 7. Membranous nettle – *Urtica membranacea.*

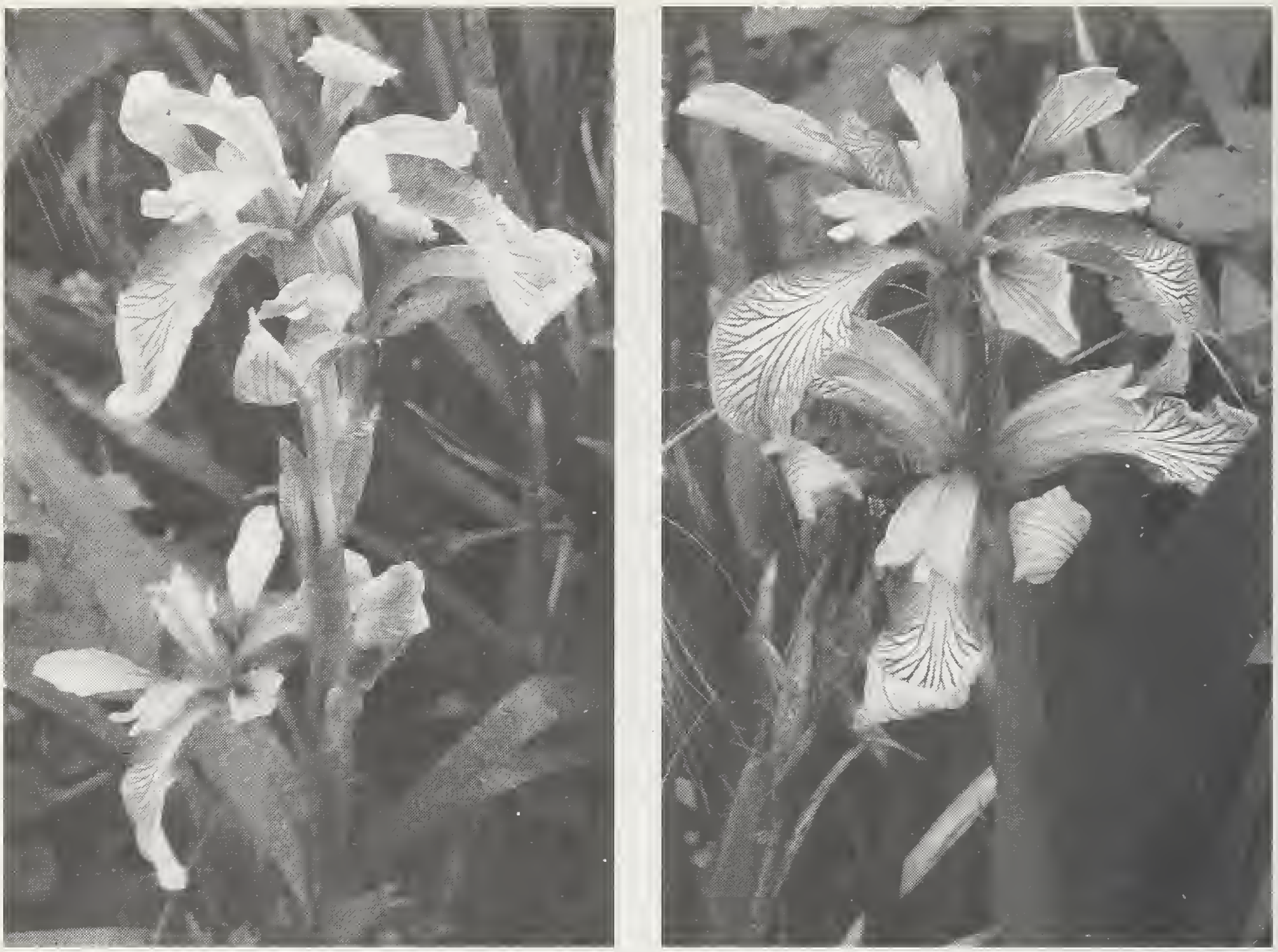

FIGURE 8. Forms of stinking iris – *Iris foetidissima.*

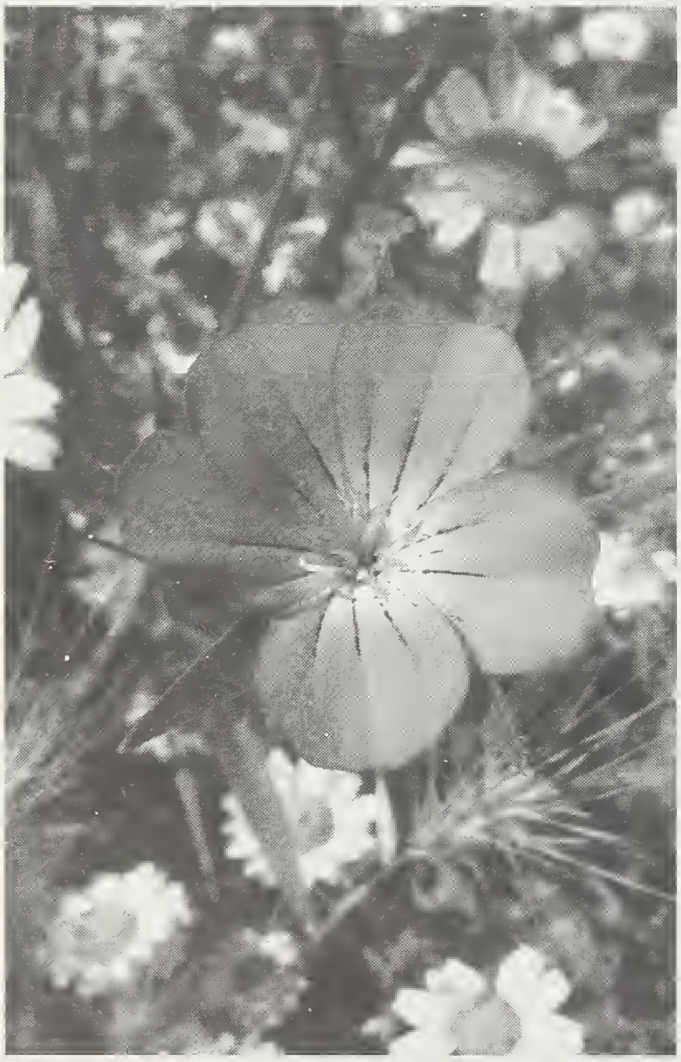

FIGURE 9. Corncockle – *Agrostemma githago.*

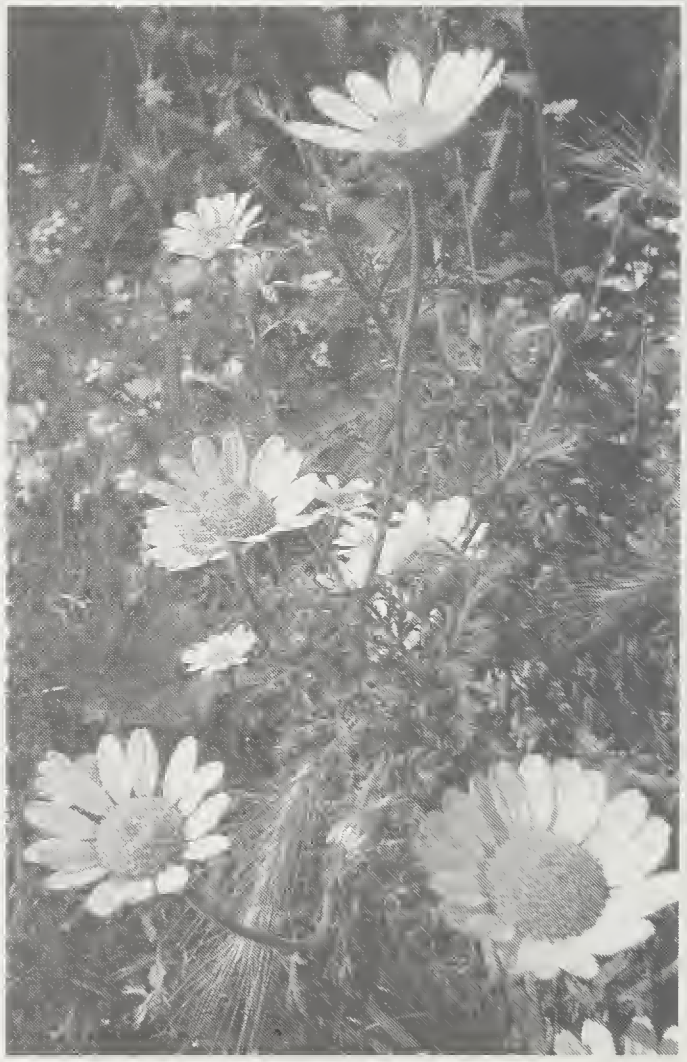

FIGURE 10. Austrian chamomile – *Anthemis austriaca.*

recently established *Anthemis austriaca* Austrian chamomile (Figure 10) should give the game away!

Industry and transport have long been known as important vectors for the movement of plants, Britain's railways, roads and canals have aided the dispersal of a wide range of plants (both native and non-native) such as *Senecio squalidus* Oxford ragwort, *Elodea canadensis* Canadian pondweed and *Cochlearia danica* Danish scurvygrass. Sometimes, these interactions can be complex and still remain to be fully understood; *Senecio inaequidans* narrow-leaved ragwort has been present in England since the late nineteenth century, yet was too scarce to be listed in the BSBI's *New Atlas of the British and Irish Flora* (Preston, Pearman and Dines 2002). That would no longer be the case; it is now romping along road and rail networks to the east of London (Burton 2007: 176). What has caused this change is uncertain.

If we are going to be able to understand the nature of change within London's flora over the coming decades then establishing a consistent baseline for our species distribution data will be essential. This means that, wherever possible, we will need to locate historic and archived data and ensure that it is transferred to accessible media that are compatible with current ways of working. Overall, it there is much need for research into non-native species ecology and how urban and disturbed environments are potential focus points for biological change.

We are entering new territory; the possible impacts of climate change may well be far greater than anything London's flora has experienced since 1666. It is probable that some plants, particularly non-natives, will continue to thrive and that we will witness the continued demise of London's native flora.

In brief, there is a need for evidence-based research, bulk observational data, effective management of data and co-operation between the London Natural History Society, GiGL and the BSBI; and finally, a new flora of the Greater London area that will be a suitable update of Burton's *Flora of the London Area*.

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Book review

The vegetative key to the British flora. A new approach to naming British vascular plants based on vegetative characters. John Poland and Eric J. Clement. Privately published by John Poland, Southampton, in association with the Botanical Society of the British Isles. 2009. 526 pp., 24 coloured plates and numerous line drawings. Softback, £25. ISBN 978 0 9560144 0 5.

This is a timely and admirable book, which will be warmly welcomed by all UK field botanists. Drawing on the assistance of a wide range of BSBI members, the authors have devised vegetative keys covering the identification of all native British (and Irish) vascular plants (excluding only a few critical apomictic genera, such as the dandelions, hawkweeds and brambles). They have also included an extensive range of non-natives including many widely planted, but not yet naturalized, species. This wide coverage (nearly 3,000 taxa are included) will be particularly helpful to botanists in London, where so much of the flora derives from overseas.

I found the carefully designed keys quick and easy to follow. However, users are strongly advised to read the explanatory introductory paragraphs first, before starting on the keys. Most of the characters used in separating one species from another were easily observed in the field. However, I often had difficulty in deciding on one particular character — the presence or absence of stomata on leaf surfaces. This is a new and potentially useful character for confirming the identity, for example, of certain grasses. But I did not find it easy to observe stomata in the field. The numerous line drawings were very helpful, and we are promised more in the next edition, which is already being worked on. The colour plates too, illustrating individual leaves of a select range of plants, were a helpful aid to identification. Some of the colour plates show the stained cross-sections of eighty species of Cyperaceae. These are beautiful images, but I found them of limited value in determining sedges in the field. As the authors point out in their introduction, 'odours may be difficult to detect by some people', and they are notoriously hard to describe in words. They can, nevertheless, be very useful, for example, in separating black currant *Ribes nigrum* from red currant *Ribes rubrum*. I was intrigued therefore to learn that one of my favourite ornamental plants, rock crane's-bill *Geranium macrorrhizum* (which occasionally establishes itself in the wild in London and elsewhere), is said to be 'strongly cat-scented'. It is certainly strongly scented, but no cat I know smells anything like it! A couple of minor errors have been pointed out to me. Due to a mislabelling of specimens sent to the artist, the illustrations on page 19 of two *Cyrtomium* species are incorrect. That labelled *C. fortunei* is actually *C. macrophyllum* (which is not covered in the text), and that labelled *C. falcatum* should read *C. fortunei*.

Throughout the summer of 2009 I was able to field trial some of the keys while monitoring changes in the flora of two recently cut woodland coppices. *The vegetative key* allowed me to identify many new arrivals in these coppices long before it would have been possible using conventional keys. I found the grasses key particularly useful. It enabled me to name, for example, a small tuft of pampas grass *Cortaderia selloana*, at least a year before its large size and inflorescence would give it away. Similarly, water bent *Polypogon viridis* (spreading fast in many parts of London) was rapidly identified by its striking 'fimbriate' ligule margin (the helpful glossary explained the meaning of fimbriate: 'fringed; having the margin cut into long, slender lobes'). I was less confident in determining an unknown species of *Sorbaria*, whose identity seemed to hang on the presence or absence of 'occasional stellate hairs' on the undersides of the leaflets. This was the only plant that defeated me during the summer, and there were many arrivals in the coppices that I could not have named without *The vegetative key*. With fieldwork now under way for the proposed new flora of London, this publication is most timely. The authors rightly point out that one of the biggest threats to plants and botany (in addition to the continuing loss of habitats) is 'the lack of botanical expertise through diminishing higher education courses'. This splendid book will certainly encourage and assist all of us to become a little more expert. Buy it!

David Bevan

Predictions for London's natural history in 2058

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This paper was presented at the Society's 150th anniversary conference 'London's Natural History — past, present and future' held in association with the Linnean Society of London and the Society for the History of Natural History at Burlington House, Piccadilly on 11 October 2008.

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Introduction

When John Edgington asked me to contribute to this conference he suggested that I review the current state of nature conservation in London and make some predictions regarding London's natural history in 2058. I have to say I was delighted to accept the challenge, especially since the proceedings would be published and, assuming that the society still exists in fifty years' time, I can confidently predict it will provide members with much amusement in proving me right or wrong!

I shall start by looking back over the past twenty to thirty years to see what has been achieved in nature conservation, and also review some of the changes in London's wildlife over this period. I am greatly helped in this by several of the other contributors to this conference, notably those dealing with plants, bugs and beetles. They all illustrate different elements of the same story. Whilst we are on fairly firm ground in assessing what has happened, in terms of changes in both natural history and nature conservation policy, looking ahead for the next fifty years poses many uncertainties. However, it seems clear from current predictions that climate change will be the overwhelming influence on London's ecology and natural history over this period and I make no apology for focussing almost entirely on the impacts of climate change in my predictions.

Nature conservation in London

The past thirty years have seen dramatic developments in establishing nature conservation as part of the statutory system of planning in London. To put this in perspective it is worth looking back to the early 1980s. At that time there was no mention of nature conservation, or ecology, in either the Greater London Development Plan, or in any Local Plans of London boroughs. With establishment of a new Ecology Unit in the Greater London Council in 1982, strategic policies for nature conservation were developed which rapidly gained acceptance in many London boroughs (GLC 1984). These benefited from strong political backing from the GLC. Alongside this came a substantial body of local support for the conservation of ecological sites of value to local people. Examples were the Parkland Walk in Haringey and Gunnersbury Triangle in Hounslow. During the past twenty-five years numerous other planning cases have resulted in conservation becoming firmly accepted as part of the planning process.

However, prior to 2000 this was largely on a voluntary basis. Although the system developed in London to deliver nature conservation at the local level was the most sophisticated in the whole of the UK, there was no statutory requirement on the boroughs for such a system to be adopted. It relied heavily on the goodwill of London boroughs and on provision of expert advice from the London Ecology Unit to make it all work. But all this changed with the establishment of the Greater London Authority in 2000 when the new London mayor was required by law to produce a Biodiversity Action Plan alongside other London-wide strategies such as Transport and Economic Development. In response to this Mayor Livingstone adopted the procedures which had been developed and implemented by the London Ecology Unit over the previous thirteen years. He used these as the basis for nature conservation in his statutory London Plan published in 2004. So for the first time nature conservation became a formal and statutory part of planning in London.

What were the features of this approach which were so important? The London Ecology Unit had developed well-established criteria for the evaluation of sites at several different levels. Most important are those of London-wide significance, of which there are nearly 140 sites. Then there are many more which are important within each individual borough. Thirdly, there are sites of local importance, of value to local communities. In total over 1,500 sites of nature conservation value are recognized in London. The criteria for evaluation have been tested at numerous public enquiries and the whole system has depended on detailed ecological surveys, first carried out in 1983 and repeated periodically since then. An important aspect of the approach has been the identification of areas of deficiency of nature, with the requirement in the London Plan that boroughs should take measures to alleviate any such deficiency. The whole process is now well embedded in the strategic planning framework, alongside other aspects of heritage conservation, such as historic buildings and archaeology.

The voluntary sector has also played an important role in this whole process. Here I would like to pay tribute to the work of the LNHS in nature conservation, which was under way long before other organizations were involved. Proposals made by the LNHS in 1946 led to the protection of a number of key sites as Sites of Special Scientific Interest by the Nature Conservancy. The work of the LNHS Nature Conservation Committee, especially during the 1960s–'70s, was significant at a time when the Society was a lone voice. All this is described in detail by Jan Hewlett (2004) in her Presidential Address of 2003. Then came the London Wildlife Trust in 1980. Initially something of an agitprop organization, it soon became the leading player in running campaigns to save important sites and has taken on the management of numerous nature reserves throughout London. The Trust has generated substantial public support for conservation, not only through campaigns, but also through its popular surveys of species such as hedgehog, stag beetle and fox. The sudden enthusiasm for nature in London, generated during the 1980s, led me to describe it as a green renaissance (Goode 1986). This widespread public support has been a crucial factor in the success of urban nature conservation over the past twenty-five years.

Recently a broader constituency of bodies has been brought together through the London Biodiversity Partnership. This has targeted critical species and habitats which are particularly important in London. The partnership has developed innovative projects such as promotion of green and brown roofs for the conservation of urban wasteland species and communities, including the black redstart. It has also promoted the conservation of wildlife in private gardens and cemeteries, as well as targeting more traditional habitats such as ancient woodlands, heathlands and grazing marshes.

The last ten years have also seen the construction of some major new habitats such as the London Wetland Centre at Barnes, which has not only become one of the best birdwatching venues in London, but is also extremely popular with the general public. I well remember a boat trip on the Thames in the mid 1980s to which Sir Peter Scott and his wife Philippa were invited. During our trip down the river he asked me where in London I thought it might be possible to develop a Wetland Trust centre like Slimbridge. At the time both Stoke Newington and Barn Elms reservoirs were due to become redundant as a result of the new London Ring Main, and I told him that there may well be an opportunity to develop a new centre at one of these. He was tremendously excited at the prospect of developing a wetland centre in London and the Wildfowl and Wetlands Trust soon entered into negotiations with Thames Water to create a new wetland at Barnes. Their proposals gained planning approval in 1995 and the result is one of the most impressive habitat creation schemes in Europe. As well as large numbers and a great variety of ducks, a vast array of other wetland species now occur regularly, including bittern, heron, water rail, lapwing, snipe and little ringed plover. Even avocets have nested successfully. Waterfowl populations, especially gadwall and shoveler, have grown significantly and resulted in the site being designated as an SSSI in 2002. It demonstrates what is possible even in the heart of the urban environment only four miles from Buckingham Palace.

The Wetland Centre may be the most outstanding example of habitat creation, but it is only one of many schemes developed over the past thirty years. Camley Street Natural Park beside the Regent's Canal at King's Cross and Meanwhile Gardens, further along the canal near Paddington, were early examples of small ecological parks which have been enormously successful in catering for local communities in densely built-up parts of London. Yet another larger example is South Norwood Country Park, with a variety of wetland habitats developed on an old sewage works in Croydon, which has become a favourite place for south London birders. All of these have been developed as part of the renewed vigour brought to nature conservation over this period. More details of these achievements for nature conservation in London can be found in Goode (1986, 2005, 2007), also Mayor of London (2002).

So where do we stand on this 150th anniversary of the LNHS? With the legacy of the London Ecology Unit we have the most detailed and successful set of planning policies for conservation of any part of the UK. There is also a well-developed voluntary sector with a large number of key players including LNHS, LWT, WWT, RSPB, and BTCV all contributing significantly. Added to this are the official agencies responsible for managing many of London's key sites, including the Royal Parks, City Corporation and Thames Water. I believe that London is well placed to ensure that conservation of habitats and species is given high priority in future years and that adequate measures will be taken to deal positively with the effects of climate change. We can only hope that growing public interest in environmental matters will ensure that conservation prevails whatever changes occur in the political landscape.

Current trends and changes

We can be fairly confident that some of the changes which are likely to occur over the next fifty years will simply be an extension of existing trends established over past years. So it is worth looking back over the past fifty years to see what has been happening. I am more familiar with such changes as they have affected bird populations, and since these are also rather better documented than other groups I shall concentrate mainly on birds. What are the main causes of change for bird populations over this period? The positive factors can be summarized as follows:

- Improvements in air and water quality
- Decline in game management with increased tolerance of predators and scavengers

- Recovery of predators from the effects of pesticides
- Colonization by new species from elsewhere (including introductions and natural spread)
- Increased public interest with extensive feeding of garden birds and encouragement of wildlife in public open spaces and parks
- Effective protection of important habitats
- Provision of artificial nesting sites for some specialized species
- Creation of new habitats, especially wetlands
- New legislation and Biodiversity Action Plans

Table 1 lists the birds which were new as breeding species during the past fifty years. Of these twenty-two species a large number are waterfowl which have become naturalized following their escape from collections. Mandarin duck, Egyptian goose, Canada goose, ruddy duck, greylag goose, gadwall and pintail are all in this category. Ring-necked parakeets also came this way. Others like collared dove, Cetti's warbler, firecrest and little egret have made their own way here from further south and some are now well established as breeding species in London. In some cases, like little egret, the changes appear to be a direct result of climate change. Others such as cormorants have moved in to make the most of available food sources. Common terns have made use of nesting rafts at the Welsh Harp reservoir and in the London docks and there are now substantial numbers breeding in London. Peregrines and buzzards owe their presence to a national expansion of their range. The falcons started to move into English cities in the 1990s and first nested in central London in 2000 where they are now well established. With reduced persecution buzzards have shown a broad easterly spread across southern England reaching London about 2000. They too have bred in London in recent years. Overall the capital has seen an increase in predators, including hobby, sparrowhawk, buzzard, red kite and peregrine falcon in recent years.

TABLE 1. New breeding birds in London since 1950.

Collared dove	Black-headed gull	Marsh warbler
Canada goose	Egyptian goose	Firecrest
Mandarin duck	Ring-necked parakeet	Avocet
Lesser black-backed gull	Ruddy duck	Little egret
Herring gull	Cormorant	Peregrine falcon
Common tern	Greylag goose	Buzzard
Oystercatcher	Pintail	
Gadwall	Cetti's warbler	

The effects of climate change can be seen in the increased numbers of wintering bittern and even penduline tit and increasing numbers of blackcap, Cetti's warbler, water rail, Dartford warbler and Mediterranean gull. The wintering population of Mediterranean gulls on the Thames downstream of London has grown enormously in recent years and it will not be long before pairs are breeding in London.

On the other hand it is clear that many previously common species have declined, and in some cases no longer occur as breeding species in London. Whilst some of these changes may be related to the gradual urbanization of London, in most cases the loss is part of a wider national picture with dramatic declines in what were formerly common birds of the English countryside. In London this has led to a significant decline in species such as turtle dove, woodcock, cuckoo, barn owl, sand martin, wood warbler, tree sparrow, nightingale, and spotted flycatcher. The decline in numbers of house sparrows appears to be a somewhat different process as this has particularly affected populations in towns and cities. Swifts too are showing signs of a decline as older buildings are replaced with modern structures lacking suitable nest sites.

But what has been happening to other wildlife? The effects of climate change are particularly striking in the case of some invertebrate groups. The past ten years have seen a northward expansion of the range of many butterfly and dragonfly species. Whilst the speckled wood was once quite restricted it now extends across the whole of London. A number of species with a formerly restricted distribution such as the hornet and Roesel's bush-cricket have now spread widely in southern England. Other more recent arrivals such as small red-eyed damselfly, long-winged conehead, wasp-spider and harlequin ladybird are fast becoming established as new species in the UK.

Dragonflies have shown some of the most dramatic changes in response to climate change, with nine species demonstrating strong northward expansion of their range in the UK (Table 2). Some other species which previously only occurred as migrants are now on the point of colonizing the UK. These include the lesser emperor and red-veined darter, both of which have occurred at the London Wetland Centre in increasing numbers over recent years. The black darter is also showing an expansion, or infilling, of its range in southern England which may well be through colonization from Europe.

TABLE 2. Dragonflies showing strong northward expansion in the UK in response to climate change (after Corbet and Brooks 2008).

Southern hawker	Banded demoiselle	Yellow-winged darter
Migrant hawker	Broad-bodied chaser	Ruddy darter
Emperor	Black-tailed skimmer	Common darter

Looking ahead to 2058

I am well aware that it is dangerous to make firm predictions about future changes in wildlife. One of the most famous in the London context was that of W. H. Hudson who said in 1898, '*It is exceedingly improbable that any of the raptorial species which formerly inhabited London — peregrine falcon, kestrel and kite — will ever return*'. In fact kestrels returned to central London as a breeding species in 1933, and peregrine falcons in 2000. Today red kites are on the brink of moving back into London, though admittedly from the reintroduced populations of the Chilterns. However, we can be fairly confident that many of the trends associated with climate change which I have described above will continue over the next fifty years, and that our fauna and flora will change through the arrival of many Continental species which do not occur in the UK at present.

There is, however, another factor which needs to be taken into account. That is the issue of introductions. A number of other contributors have highlighted the issue, pointing to the large number of species being introduced into London, especially invertebrates and plants, which because of climate change are now capable of becoming established and naturalized in the UK. We are likely to see increasing numbers of such introductions posing problems, especially plant pathogens and insect pests imported with timber and plant material. Recent examples include the horse chestnut leaf miner and increased incidence of canker. Imagine what would happen if the London plane was infected by an introduced species of Phytophthora. This could have devastating consequences for London's landscape, yet it is quite within the bounds of possibility within the next fifty years. There is in fact a huge range of potential introductions which are just waiting to happen. Species such as Chinese mitten crab, and Turkish crayfish have already become well established. These are species which are very difficult to predict in advance and I suspect we shall see many others of this kind.

However, over the next fifty years climate change will be the overriding factor affecting London's species and habitats. Current predictions for London suggest the following:

- By the 2050s there will be an increase in average annual temperature ranging from 1.5°C (low emissions) to 2.5°C (high emissions)
- Winters will be warmer by 1° – 2°C
- Summers will be warmer by 1.5° – 3.5°C

Alongside this the urban heat island effect already provides a further 5 – 6°C in summer night-time temperatures. Potential impacts of these changes are clear in broad terms. There will be a northward movement of species from Continental Europe colonizing the UK. London will provide a springboard for such colonization because of its heat island effect. We already see evidence of this in the number of plant and invertebrate species colonizing the capital. Changes will also affect London's habitats. There will be changes in species composition of many habitats, reflecting drier conditions (exacerbated by the heat island effect). This is likely to lead to the loss or decline of natural wetlands.

There have so far been few attempts to predict the effects of climate change on specific groups of animals or plants. However, *A climatic atlas of European breeding birds* (Huntley et al. 2008) does precisely this for birds, making predictions regarding the likely breeding range for most species towards the end of this century. It also indicates those species which are likely to suffer declines in particular areas over the same period (Table 3). Using these predictions for southern England it is possible to indicate current breeding species which are likely to be lost, and conversely those species which are currently rare or absent which are predicted to occur as breeding species by late in the twenty-first century.

TABLE 3. Current breeding species which are predicted to be lost or decline in SE England by late twenty-first century. (? indicates unlikely to be lost completely). After Huntley 2008 et al.

Great crested grebe	Oystercatcher	Sand martin?
Cormorant	Ringed plover	Meadow pipit?
Mute swan?	Lapwing	Marsh warbler
Greylag goose	Snipe	Lesser whitethroat
Shelduck	Woodcock	Willow warbler?
Gadwall	Redshank	Bearded tit
Shoveler	Lesser black-backed gull	Willow tit
Pochard	Herring gull	Treecreeper
Tufted duck	Common tern	Redpoll

How do these predictions relate to London? The potential declines and losses are cause for particular concern as they include several of our most familiar species today, such as the mute swan and willow warbler. The list is based on the likelihood that wetland habitats will be particularly at risk, hence the strong bias towards wetland species. This raises the question as to whether it will be possible artificially to maintain freshwater wetlands under the new climatic regime. I suggest that priority should be given by the Environment Agency and Thames Water to finding ways of accommodating such wetlands within major flood alleviation schemes, as a means of ensuring their survival.

The list of potential newcomers is considerable, but clearly for many of these even if the climatic conditions were right there would not be suitable habitats for them to thrive in London (Table 4). However, there are some which, if they start to colonize the UK, could be expected to move into London, and which we might expect to become a normal part of our fauna by 2058. Such species are listed in Table 5 for a range of habitat conditions. Some like the egrets and Mediterranean gull are already undergoing considerable expansion of their range. There seems little doubt that they will soon become established in London. Others like the black woodpecker and crested lark have already spread to the Channel coast, but so far have been resistant to making the move across the water. Many of the species listed are migratory and these have a greater chance of establishing themselves in the UK, as in the case of black-winged stilts which recently nested in northern England.

TABLE 4. Species currently absent or rare, which are predicted to occur as breeding species in SE England by late twenty-first century. Excluding species predicted to occur only along the extreme south coast. After Huntley et al. 2008.

Night heron	Scops owl	Great reed warbler
Little bittern	Nightjar	Melodious warbler
Purple heron	Alpine swift	Dartford warbler
Honey buzzard	Hoopoe	Western Bonelli's warbler
Black kite	Wryneck	Firecrest
Short-toed eagle	Grey-headed woodpecker	Crested tit
Marsh harrier	Black woodpecker	Short-toed treecreeper
Hen harrier	Middle spotted woodpecker	Golden oriole
Montagu's harrier	Crested lark	Red-backed shrike
Corncrake	Woodlark	Woodchat shrike
Little bustard	Tawny pipit	Rock sparrow
Stone curlew	Black redstart	Serin
Kentish plover	Cetti's warbler	Cirl bunting
Yellow-legged gull	Fan-tailed warbler	

New birds of parks and gardens include some that are already established as localized breeding species in southern England. It seems very likely that serins and firecrests will expand their range in the UK. and the parks and gardens of London would be eminently suitable for both. Icterine warblers are well attuned to city life, occurring in parks and gardens of most major cities on the Continent and are very likely to colonize London. Short-toed treecreepers currently breed in the Channel Islands, but have yet to cross the Channel. They would be equally at home in London if they can make the initial move. The same applies to crested tits which are extremely sedentary by nature. I put my money on the hoopoe being one of the new colonists, especially in some of our larger open spaces. We are already seeing the early stages of colonization by the monk parakeet, which could well follow the example of the ring-necked parakeet which has successfully colonized London's open spaces.

Wetlands offer considerable opportunities for new species. The main problem lies with the long-term viability of freshwater wetlands in the face of increasingly dry climatic conditions. But, if concerted efforts are made to ensure the maintenance of such wetlands as part of flood alleviation schemes, I see no reason why all the species listed should not become established in London within the next fifty years. Flooding may itself give rise to other opportunities. With rising sea levels, low-lying land in the flood-plain of the Thames may well become flooded by storm surges from the North Sea and

TABLE 5. Birds which may well become established in London by 2058 in response to climate change.

Parks and large suburban gardens	Wetlands	Woodlands	Urban wastelands and post-industrial landscapes
Serin	Night heron	Black woodpecker	Black redstart
Short-toed treecreeper	Spoonbill	Middle spotted woodpecker	Crested lark
Firecrest	Little bittern		Dartford warbler
Hoopoe	Little egret	Melodious warbler	Fan-tailed warbler
Crested tit	Cattle egret	Bonelli's warbler	
Icterine warbler	Black-winged stilt	Golden oriole	
Monk parakeet	Black-tailed godwit	Short-toed treecreeper	
	Avocet		
	Penduline tit		
	Great reed warbler		
	Osprey		
	Mediterranean gull		
	Yellow-legged gull		
	Black kite		

this would provide a range of new brackish-water wetlands, which would attract many of these species. Herons, egrets, spoonbill, avocet and stilt would benefit particularly from such conditions. Also, with the possibility of extensive areas of such habitats being created by coastal flooding in The Netherlands, much larger populations of wetland species could become established in NW Europe, from which London would benefit.

For woodlands the same issues arise as with parks and gardens. It is the sedentary nature of the birds which may prohibit their colonization. Black woodpeckers cope with urban living, being well established in the woodlands of Brussels and Paris. They have been gradually expanding their range in Europe and could easily become established in the UK if they would just cross the Channel. Golden orioles may be prevented by shyness from colonizing London's woodlands but the habitats are quite suitable.

Finally we come to the post-industrial habitats. Perhaps by 2058 there will be a wider variety involved including relict areas of service industries, perhaps even the remains of out-of-town shopping malls. Derelict land, whatever its origins, will play host to black redstarts and in time to crested larks which must eventually make the move northwards across the Channel. Urban wasteland under the climatic regime projected for 2058 will be ideal for fan-tailed warblers, and as such areas become colonized by gorse, Dartford warblers may well make a come-back.

What role will there be for the LNHS?

Sadly, I shall not be here to see the colonization of London's parks and gardens by hoopoes. Nor will the majority of current LNHS members, given the age structure of our membership. So what will the society be like by 2058? Will it still exist and, if so, what role will it play?

The next fifty years are going to see profound changes in London's wildlife. As climate change really starts to bite it will become increasingly urgent for there to be a body of naturalists capable of documenting the changes. So there will be a continuing role for the LNHS, even more so than today, surveying, recording and cataloguing London's wildlife. Central to all of this there will be a crucial need for amateur naturalists who are good taxonomists.

Yet membership of the society is gradually, but inexorably, getting older. We were reminded of this by Richard Fitter when he spoke at our Members' Day conference at Barn Elms Wetland Centre on 1 February 2004. His concern was that '*if the society fails to recruit younger people to learn identification skills, the LNHS itself will become an endangered species*'. Sadly, as we lose older members their skills and expertise go with them. At present the society has a most remarkable range of knowledge and expertise in its membership, with specialists in the taxonomy of most groups of our fauna and flora. This is a body of expertise that we should capitalize on for the future. I agree with Richard Fitter that the LNHS should place much more emphasis on promoting training of the next generation of dedicated field naturalists. We should draw on the skills and knowledge of our existing members to do this. We have about ten to twenty years available to make the most of our present expertise in training the next generation. But if this is to be done it will require a radical shift of emphasis to meet the challenges ahead. First is the need to attract younger members into natural history and second the need to train them so that they become proficient naturalists. The society is doing neither of these at present.

Attracting young people through the internet

The LNHS needs to put its mind urgently to ways of bringing in young people. They are our future. But how do we do this? One possibility is to encourage use of the internet to stimulate involvement in natural history. Using the internet has become second nature to most young people, so perhaps we should look for innovative ways in which it can be used to best effect to bring in new blood. For example, the increased use of digital and mobile-phone cameras has led to a surge of natural history photography, particularly using the web-site Flickr. Many of the photographs are posted by people who have relatively little knowledge of natural history. But there are others who add notes confirming or correcting their identifications. It is a somewhat disorganized but rapidly developing field and one where the LNHS could play a vital role in bringing a sound knowledge of taxonomy to bear. I suggest that the society should set up a dedicated section of Flickr devoted to London's flora and fauna and invite anyone to contribute photographs. LNHS specialists could provide editorial comments.

What if we were to use the internet more widely? I believe the possibilities would be enormous. The rapid growth in popularity of Facebook demonstrates what is possible. If we had a dedicated website for people interested in nature there are all sorts of ways in which it could be used, not just to promote the LNHS, but also to develop community-based science programmes. Mobile phones can already provide satellite location down to a few metres and the internet could provide keys for identification of species. Yes, there would be need for verification, but the possibilities are endless. It has become possible to develop recording schemes on a scale never contemplated before.

There are already some initiatives to develop this kind of approach. The Open Air Laboratories network (OPAL) run by Imperial College London jointly with the National Biodiversity Network has a number of schemes up and running, including some in London. They are open to anyone with an interest in nature and are designed to inspire a new generation of field naturalists. The LNHS would do well to work with these newly developing schemes, providing the necessary input of expertise on taxonomy which will be essential to their success. These schemes could be designed to investigate and record biological responses to climate change, using a large number of observers all contributing to the same data bank. The power of the internet is so enormous and it will take us into completely new fields of activity that could be extremely productive.

The approach would be very different from anything that the LNHS has done before, for we may never meet the young people concerned. But I believe that once they are involved many will want to make more direct contact with our members, particularly the specialist recorders. Many naturalists will tell you that it was a particular teacher or enthusiast who set them on the road to natural history. Using the expertise of existing members of the LNHS to generate that enthusiasm among the younger generation could be one of our greatest assets. If we don't take some positive action to bring in younger members then sadly I suggest that by 2058 there won't be any naturalists left in London to repudiate my predictions!

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Max Nicholson — environmentalist, ornithologist, author and administrator

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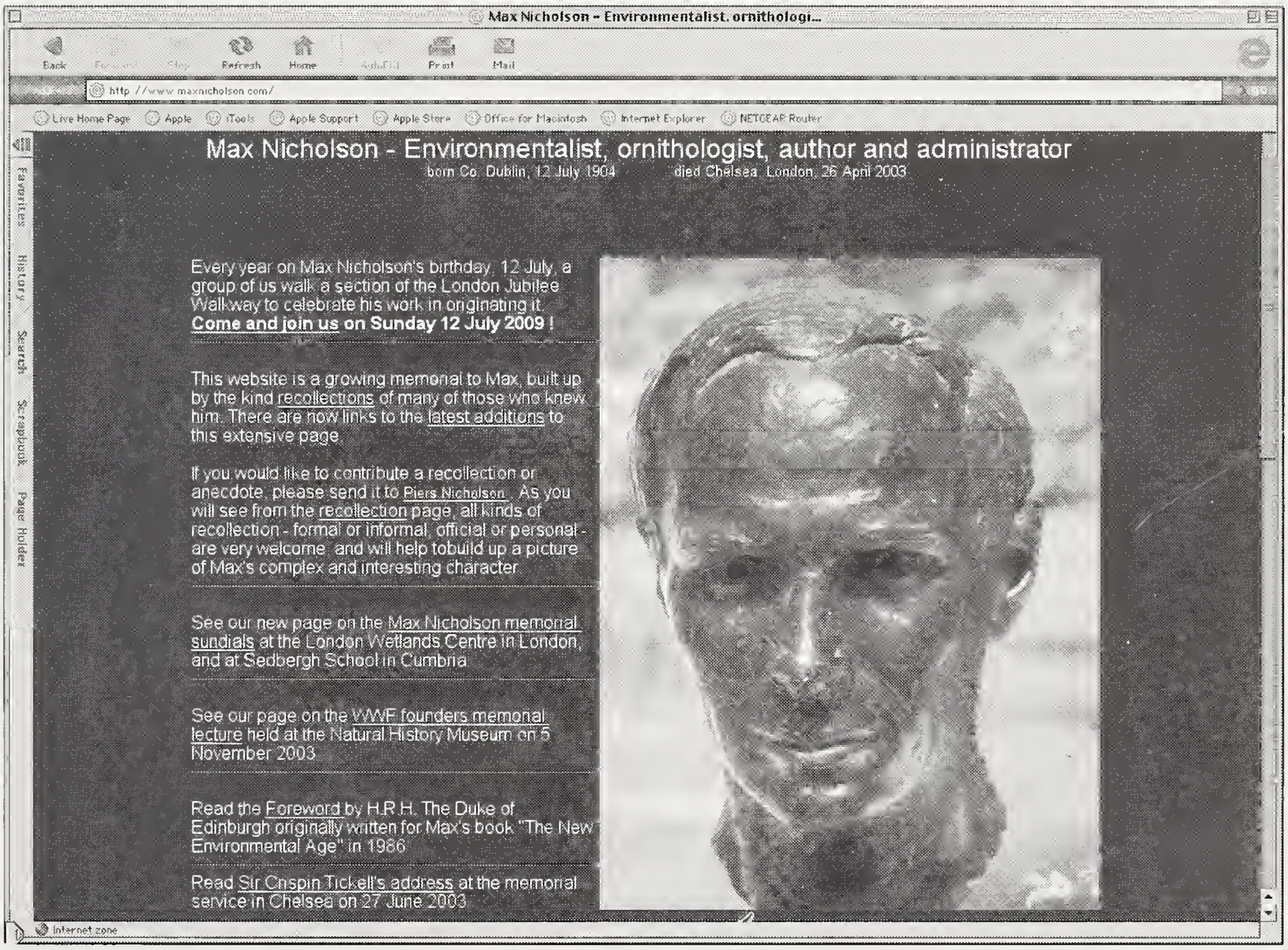
Abstract

This paper introduces and provides a 'taster' of the website dedicated to the late Max Nicholson (1904–2002), www.maxnicholson.com. This site was created by Max's eldest son, Piers; Tom is his second.

Originated some time ago and still growing, the site gives a very full picture of Max's long life and work, including:

- publications still available
- honours, awards, positions held — a long and extraordinary list
- a few photographs at various ages

As well as the many obituaries, it offers a varied set of reminiscences and invites more.



Max Nicholson - Environmentalist, ornithologist, author and administrator

born Co. Dublin, 12 July 1904 died Chelsea, London, 26 April 2003

Every year on Max Nicholson's birthday, 12 July, a group of us walk a section of the London Jubilee Walkway to celebrate his work in originating it. **Come and join us on Sunday 12 July 2009 !**

This website is a growing memorial to Max, built up by the kind recollections of many of those who knew him. There are now links to the latest additions to this extensive page.

If you would like to contribute a recollection or anecdote, please send it to Piers Nicholson. As you will see from the recollection page, all kinds of recollection - formal or informal, official or personal - are very welcome and will help tobuild up a picture of Max's complex and interesting character.

See our new page on the Max Nicholson memorial sundials at the London Wetlands Centre in London, and at Sedbergh School in Cumbria.

See our page on the WWF founders memorial lecture held at the Natural History Museum on 5 November 2003.

Read the Foreword by H.R.H. The Duke of Edinburgh originally written for Max's book "The New Environmental Age" in 1986.

Read Sir Crispin Tickell's address at the memorial service in Chelsea on 27 June 2003.

Commentary and excerpts

I do not propose here to write about the photographs, and a list of publications (still to be completed by the addition of earlier and out-of-print works) may be seen on the site. Accepted honours — not all were accepted — included CB, CVO, and Commander, Order of the Golden Ark (Netherlands). Max boasted three honorary doctorates, ten honorary fellowships, and many awards in this country and abroad.

The obituaries, from all the broadsheets and many of the organizations with which he was associated, together with letters from many friends, provide detail of Max's various activities, as does Sir Crispin Tickell's address at the memorial service in June 2003. All of these except *The Times* obituary are reproduced in the website, and collectively they indicate an astonishing range of interest, achievement and distinguished acquaintance. The achievements range from published and edited works on birds, environment and ecology, and the state of Britain, journalism, and critical wartime and post-war civil service, to instigation of many major and long-lasting organizations, several of which he administered or headed. Along the way, he played a leading role in the 1951 Festival of Britain and the establishment in 1977 of a number of Jubilee initiatives for London, including the Silver Jubilee Walkway, still flourishing today — see the website for detail of the celebration for Max's birthday on 12 July each year. He was editing *Birds of the Western Palearctic* in his nineties and remained in all respects until shortly before his death very far from the picture of idle retirement.

Max Nicholson. *Photograph courtesy British Trust for Ornithology.*

The following representative selection, almost all from the documents on the site, provide something of the flavour:

From the obituary in *The Daily Telegraph*

'Max Nicholson, the ornithologist, writer and civil servant who died on Saturday aged 98, made some of the greatest — many would say the greatest — contributions to nature conservation and to the emerging environmental movement in Britain in the 20th century.

'In 1949, as the senior civil servant in charge of the office of Herbert Morrison, deputy prime minister in the post-war Labour government, Nicholson persuaded Morrison to devote government time to setting up the world's first statutory nature conservation body, the Nature Conservancy, which Nicholson was later to run for 14 years as director-general.

'In 1960 Nicholson chaired the committee which set up the World Wildlife Fund, the first global conservation pressure group. He had already founded, in 1933, the British Trust for Ornithology, a body which provided scientific evidence for the devastating effect of modern agriculture on the countryside. His flair for organisation was tested to the full when he was appointed to lead the division of the civil service that allocated tonnage to convoys from 1942 to 1945, and again when he was secretary of the committee which organised the Festival of Britain in 1950–51.

'At the end of his career Nicholson was the author of two best-selling and influential books: *The System* (1967), a devastating critique of the British system of government, its love of secrecy, and its stifling of innovation; and *The Environmental Revolution* (1970), an account of the post-war transformation of public life and thought which he had partly helped to lead.'

From the obituary in *The Guardian*

'He was a catalyst, inspiring people to achievements beyond their own expectations. Perhaps one of his best efforts was the first conference in 1963 of The Countryside in 1970, a programme led by the Duke of Edinburgh; its final and well-supported 1970 conference was a fitting contribution to the European Conservation Year 1970, which had drawn much of its strength from the British environmental movement led by Nature Conservancy.'

From the obituary in *The Independent*

'Sometimes he operated within government organisations, sometimes from outside. Indeed he saw himself as a scourge of the "Establishment", fervently believing that Britain could again be a great nation if run by what he called a "Counter-Establishment". He caused more than a small stir with his 1967 book *The System*.'

An important feature of the website is the collection of formal or informal recollections and anecdotes, from many different sources. One is a long letter from Max himself to an American friend in November 1940 about London and bombs, including:

'The curious thing is the way it is all given a status of normality, not by some sort of neurotic adaptation, but by embracing it into the English social pattern, just as if the Bishop's wife had to have Gandhi and Harry Pollitt and the local pawnbroker to tea and treated it as the most natural thing in the world. The idea that bombs are terrifying and intolerable is therefore submerged in the very strong insistence on treating them as a rather special but quite normal and accepted institution, of a sort no one expects to enjoy much like a flower show where it always rains and everyone knows it always will. So instead of the bomb destroying the civilisation the civilisation practically destroys the bomb — well, all but!'

Max introducing a chapter of *The Humanist Frame*, George Allen and Unwin, 1961

'It now appears that at quite early stages in prehistory, man stumbled on means of over-exploiting his habitat for short-term gain, especially by the lavish use of fire. Other techniques followed, bringing in their train soil-erosion and loss of woodland cover over rather extensive areas of early human settlement. From the Indus valley to Greece and Italy, the regions which cradled civilization are with few exceptions deforested, with degraded and relatively infertile soils, eroded slopes and wrecked system of natural drainage and water-supply. This is man's mark as it used to be before he acquired his recent mastery over large-scale instruments and techniques of destruction. He can and does step up the impact now.'

Extract from *The Diaries of a Cabinet Minister*, Vol. 2, by Richard Crossman

'Sunday September 24th 1967.

'In the evening I was telephoned by Harold Lever who told me he'd been asked to appear on The World at One to represent the Civil Service and defend the

Treasury against the attack on it which Max Nicholson launched in his new book *The System*. Max, of course, is an old friend from PEP days in the 1930s and I saw something of him when he was Permanent Secretary to Herbert Morrison who, as Lord President of the Council, was in charge of such things as Science and the Research councils.

'*The System* which I read in the Dordogne, is a tremendous onslaught on the Civil Service and, in particular, on the mandarin mind. This, he thinks, is the product of mods and greats at Oxford, which teaches one abstract philosophy and ancient history, and is based on the assumption that a mind trained in such abstract and remote subjects can apply itself to every modern problem with assurance of success.

'*The System* got a tremendous write-up in the Sunday papers which gave me a great deal of pleasure since it is nice to see someone else being blamed for our problems apart from the Labour Government. So when Harold Lever rang up, I said "Why on earth are you going to speak?" "Well", he said, "I am the Financial Secretary to the Treasury and therefore it's my job to look after the Civil Service. I've been asked to do this by Sir Laurence Helsby". "That's all right," I said, "but for heaven's sake don't start attacking Max Nicholson because he provides invaluable propaganda for the government. What you should do is to refer to the Fulton Commission on the Reform of the Civil Service and say that it's doing a radical job of work, and somehow indicate that we know in advance that the things which Nicholson suggests are wrong." He didn't sound very convinced when we said good-bye.'

As this piece goes on to show, the advice was not followed.

Extract from Israel Sieff: the *Memoirs*, pp. 191–192, Weidenfeld, 1970

'Max Nicholson is the cleverest man I have ever met, and one of the most lovable. I may not be a good judge of which men are clever, and which men are not; but many men generally agreed to be clever have been introduced to me, usually in the hope that I might be able to assist them, and Max tops the lot. It was not a case of me being asked to assist him but of me hoping to be allowed to associate myself with his good works.

'As for judgement of which man is lovable and which is not, I speak with an authority at least equal to that of any man. For me he has represented as nobody else quite has what I have always most admired; the application of the intellect to the everyday pressing affairs of men in a steady unsensational attempt to leave them better than they were before; service of one's fellows by planning, not by preaching; blueprinting a path to that progress, not preaching theoretical pie in the sky.

'Max could fit my limited practical experience, my gleanings, my gropings into theoretical totalities which covered society as a whole. His mind was broad enough not only to see every practical social and economic problem in its complete world context, but to be able to construct viable solutions to them, and then plan patiently to bring them about. He could do it because there was everyday human wisdom in his widest calculation; this human element, not the ideal — in the planner's opinion — was the meat and drink which kept him going. If Max told me a thing could be done, I knew it could be done. However impossible of execution a project looked at any stage in the operation, I could lift my heart with "Max says it can be done". His verdicts never failed me.'

John Sheail

'Much is made of Max's radicalism. It was something very precious to him. In writing *Nature Conservation in Britain: the formative years* (Stationery Office, 2002), I had occasion to work through large numbers of Cabinet, Treasury, Minister for Science, and Scottish Office files. Max's assertiveness could cause considerable exasperation and resentment, but there is equally evidence of a profound respect among those departments for his policy-making and administrative abilities. He received comparatively few honours not so much through upsetting the Establishment, as by refusing what were offered him.'

Brian Nicholson, nephew

'I once asked Max for his guidance on environmental education in connection with a school for which I was responsible. His reply was unexpectedly succinct. "Get them outside".'

Pat Barker

'My memory of Max goes back over 30 years when he and I and the late Peter Conder stood on a mount at s'Albufera and "had a dream". We looked across the wonderful marsh area in Mallorca, which was seriously under threat from developers, and nobody seemed to care. My late husband Eddie Watkinson and I had despaired as we did not know to whom to turn for help.

'Then Max came on holiday to Mallorca, visited s'Albufera, met us and took us under his wing. Through his influence, he opened doors which, over the years, enabled s'Albufera to be purchased by the local government, and declared a Parc Natural. It is now known internationally as an area of great potential and scientific renown.'

Sue Lawley, on Max's appearance on Desert Island Discs, 1995 — full transcript also on the site, with characteristically idiosyncratic choice of records

'He boasted, justifiably, that he had had seven careers in all. But he was undoubtedly strongest, I felt, on the vast breadth of events that he had witnessed — from seeing soldiers marching off to war in 1914 (his memory of the First World War was vivid), to meeting President Truman and, at another point, entertaining the Duke of Edinburgh! But there were jokes too — how he only played cricket once at Sedbergh School but went bird watching instead. Of his eight records, I recall most clearly his choosing "Der Vogelfanger bin ich ja" from Mozart's *Magic Flute.* He told me it reminded him of birdwatching with his great friend, the distinguished naturalist Ludwig Koch — it was Koch's favourite tune, he said.'

And here is an extract from Max's unpublished autobiography

'It may have been through breathing this Irish air in early childhood that I have tended throughout my life to be "agin the government", even when briefly for certain purposes I was part of the government. Indeed, my birth on July 12 1904 coincided with Orange Day in the North as well as, less controversially, with Julius Caesar's birthday just over 2,000 years before. It antedated the separation of Southern Ireland from the United Kingdom by some sixteen years, thereby leading a series of luckless bureaucrats to run into a hail of flak through seeking long afterwards to class me as an immigrant. They all had to learn the hard way that I entered the United Kingdom directly from my mother's womb, and that, had the registrar of my birth been as rash as they in trying to assign me to an Irish Republic, he would have been sacked and probably hanged for sedition.'

The autobiography was written in the 1980s, not published at the time or since. This very interesting work gives an inside view of both Max's formative years — not otherwise recorded — and all the years of a more public life. It has been usefully abridged by John Sheail, and is looking for a publisher. An extract concerned with World War II, and Ministry of Shipping collaboration with the Russians and Americans, appears on the website.

Book review

Freshwater Megaloptera and Neuroptera of Britain and Ireland: keys to adults and larvae, and a review of their ecology. J.M. Elliott. Illustrated by D.E. Kimmins, C.J. Worthington and J.M. Elliott. Freshwater Biological Association. Scientific Publication No. 65. 2009. 71 pages. A5 softback, £19 plus p. & p. ISBN 978 0 900386 77 0.

Megaloptera ('large wing') includes the alderflies and snakeflies and Neuroptera ('net wing') the lacewings and spongeflies. Their characteristic appearance is seen in fossils dating from the Permian, making them among the most primitive of endopterygote (complete metamorphosis) insects. Only three genera from these ancient orders are described in this volume (*Sialis*, *Osmylus* and *Sisyra*) as, of the total sixty-four species found today in Britain and Ireland, only seven are aquatic or semi-aquatic at the larval stage. These species are very important elements of the freshwater fauna and help to define aquatic habitat quality, and their importance to freshwater biologists can be judged by the fact that this identification guide has been published in five editions since 1944. Malcolm Elliott was the author of the third edition of the FBA identification guide to this group in 1977, and now follows this with the expanded fifth edition. This is now more than an identification key, containing extensive ecological and life history notes on this small but fascinating and well-studied group.

Adults of all species may be found near to water, and you can't be sure if the larvae are aquatic or terrestrial, so there is a clear and well-illustrated family key covering all adults. This is followed by a species-level key for adults and larvae of those with larvae found in or near water. The larval key for *Sisyra* is incomplete, as the larvae of *S. dahlii* remain enigmatic, perhaps until the sixth edition. The remaining half of the volume is given over to extensive notes on the life cycles and ecology of the subject species and a long list of references. The notes on ecology and life cycles are a 'state of the art' summary of research, and many aspects are very well understood. In many other cases the detail remains unknown and this is made clear in the text. In contrast to many other entomological keys where ecology and distribution information is embedded in the key, these details have to be searched for in the separate section. This may lead to much page turning when distribution and habitat data are sought for confirmation during identification. In general, the key is very well illustrated and the text is clearly written and very accessible and no glossary of terms is deemed necessary as a result.

This publication is primarily aimed at practitioners who are studying freshwater fauna and I am sure it will be heartily welcomed by this community, even if some gaps still remain in the detail on the less-common species. Aquatic larvae are an interesting subject of study for the amateur entomologist too, and this volume is needed to allow species-level identification for these two orders.

MICK MASSIE

Darwin's Landscape Laboratory — biodiversity began in Bromley

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Abstract

Charles Darwin's home and workplace, 'Darwin's Landscape Laboratory', has been chosen as the UK's 2009 sole nomination to become a World Heritage Property, and was submitted by the Department for Culture Media and Sport to UNESCO at the end of January. Comprising his house, experimental garden and seven square kilometres of the countryside immediately around Cudham and Downe in the London Borough of Bromley; it was here that Darwin developed and demonstrated his theory of evolution by natural selection through the study of plants and animals in natural settings and under human management.

Andy Burnham MP, the then Secretary of State for Culture, Media and Sport, said:

> *'Darwin's contribution to our understanding of the natural world is unrivalled. His life of science was based on meticulous research in and around his home and the surrounding farmed valleys. These still survive as the tangible context for his original scientific insight. They remain — 200 years exactly after his birth — an inspiration to shape the thinking of future generations on our approach to biodiversity, ecosystems and the role nature can play in helping people adjust to the effects of climate change. It is also essential to acknowledge scientific endeavour and discovery, which are both key components in our understanding of environmental conservation.'*

Lead by Bromley Council, the bid partners include: DCMS, English Heritage, International Council on Monuments and Sites UK, Mayor of London, London Development Agency, Natural England, Natural History Museum, Woodland Trust, Kent Wildlife Trust, London Wildlife Trust, Charles Darwin Trust, Downe Residents' Association, GiGL, and input from the London Natural History Society. The nomination will be assessed over eighteen months. A final decision on inscription will be made by the World Heritage Committee at its annual meeting in the summer of 2010 in Brazil.

Darwin's Landscape Laboratory is the site where the modern scientific study of natural life was pioneered with the development of the theory of evolution by natural selection. It is an intimate farmed valley landscape surrounding Charles Darwin's home at Down House on the North Downs. He walked in the Downe and Cudham valleys every day and studied them intensely for the forty years of his scientific maturity. Many landscape features bear unique witness to the evidence he collected for his world-changing ideas in the natural sciences that were developed at Down House.

> *'From September 1854 onwards, I devoted my time to arranging my huge pile of notes, to observing, and to experimenting in relation to the transmutation of species.'* Darwin, 'Autobiography' in *Life and Letters* (1887: 71).

The Site is of fundamental importance to humanity as it is the use of the landscape as a resource for science that is important rather than a commemoration of the man who developed the theory. The ideas developed at this Site have had a profound influence on life sciences, medicine, agriculture, philosophy and religion, as well as on general views of humankind's relation to other living creatures in the natural world and on the sustainability of the planet's resources.

Following his inspirational five-year voyage around the world on HMS *Beagle,* including five weeks observing and collecting on the Galapagos Islands in the Pacific, Darwin settled in London. Then, in 1842, moved sixteen miles south to Down House to cater for his work and his growing family. The surrounding farmed landscape and its varying geology and soil types enabled him to access, via numerous footpaths and lanes, a wide variety of plants and wildlife, the raw materials for his research and scientific work.

> *'I think I was never in a more perfectly quiet country . . . . Between us and the escarpment there is not a village or gentleman's house, but only great woods and arable fields . . . so that we are absolutely at the extreme verge of the world.'* Darwin to W. D. Fox, 28 March 1843.

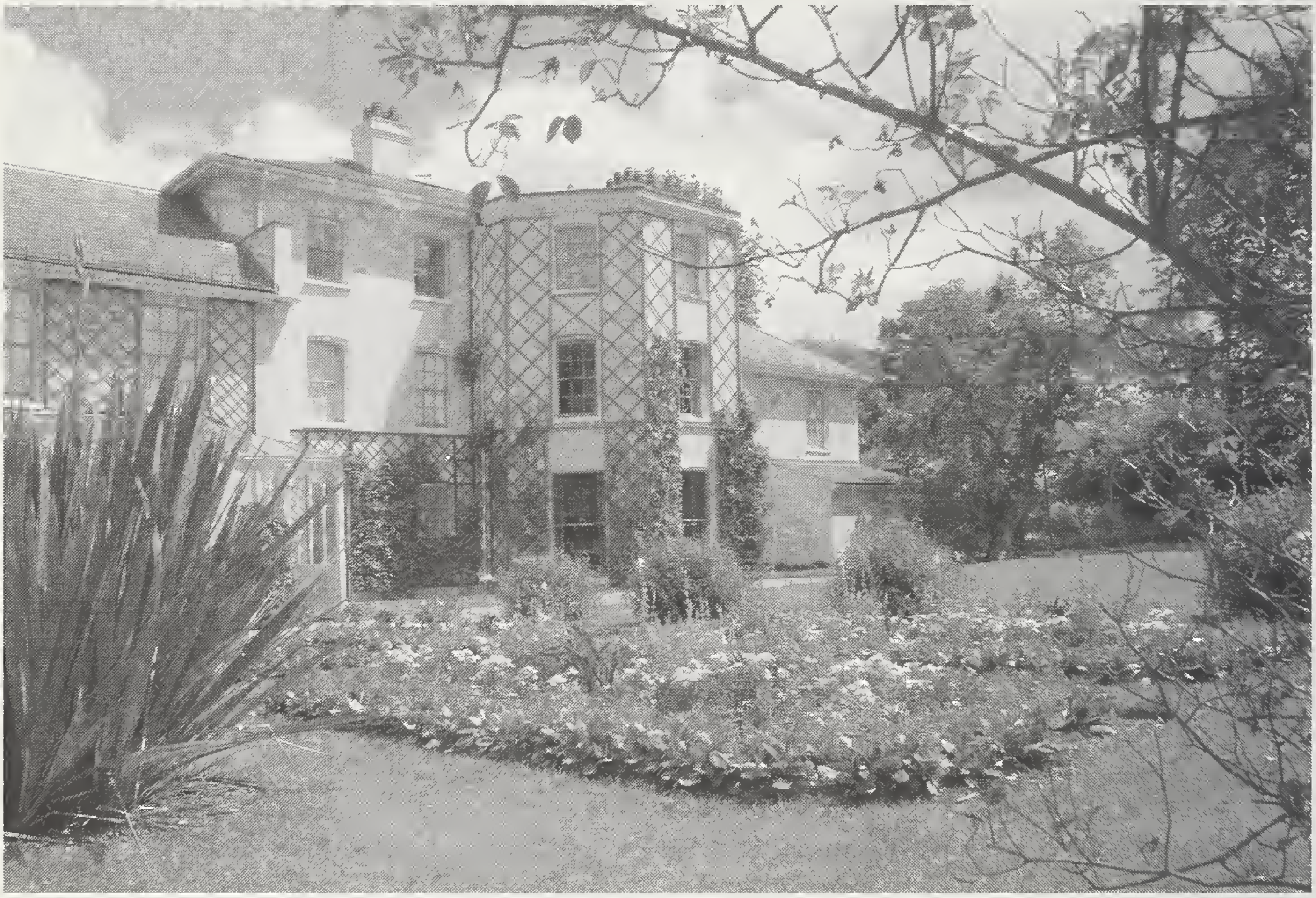

FIGURE 1. The rear of Down House in 2008. *Photo: Alister Hayes*

Finding all that he needed for his science he seldom left the locality until his death in 1882. The farmed landscape, together with Down House and its gardens were thus his workplace for his greatest period as a scientist. An experiment he conducted in the orchard to test an important point about the struggle for existence for *The Origin of Species* has been repeated there on the basis of his scientific notes and can be seen in progress on the ground.

> *'With plants there is a vast destruction of seeds, but, from some observations which I have made, I believe that it is the seedlings which suffer most from germinating in ground already thickly stocked with other plants. Seedlings, also, are destroyed in vast numbers by various enemies; for instance, on a piece of ground three feet long and two wide, dug and cleared, and where there could be no choking from other plants, I marked all the seedlings of our native weeds as they came up, and out of 357 no less than 295 were destroyed, chiefly by slugs and insects.'* Darwin, *The Origin of Species* (1859: 120).

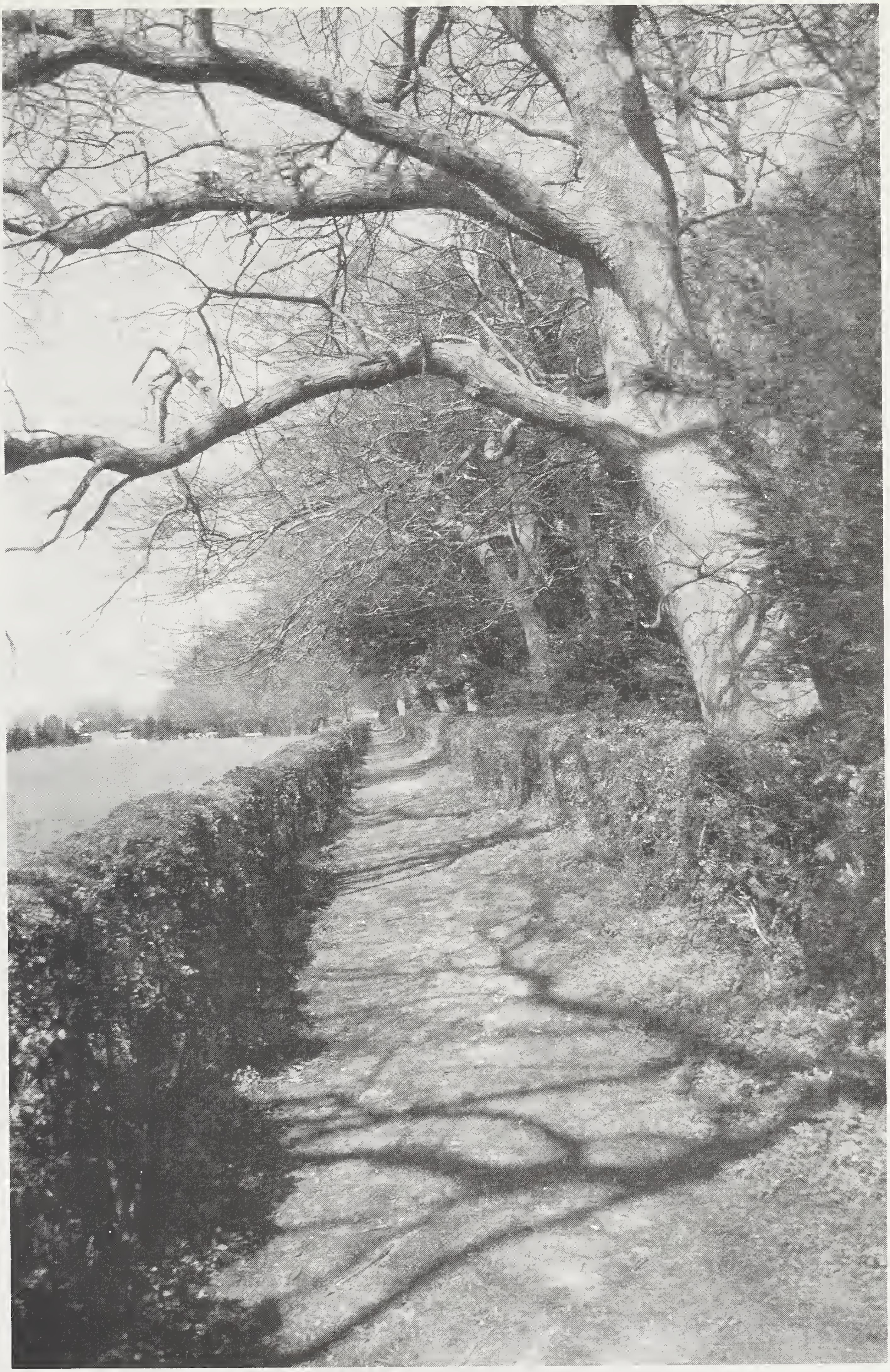

FIGURE 2. The Sand Walk. *Photo: Alister Hayes*

Darwin's theory of evolution was by no means limited to observations on natural life. It has fundamental importance for the modern understanding of the animal roots of human nature and our place in the natural world. His evolutionary understanding of human origins set out in *The Descent of Man* and *The Expression of the Emotions in Man and Animals*, both written at Downe, explained our shared ancestry with animals and made a strong case for the unity of the human races. *The Descent of Man* offered a naturalistic explanation of the origins of family and wider group bonds and the human moral sense, which has been widely influential in studies of the bases of cooperation in animal and human societies. Darwin pioneered the analysis of human experiences and their communication through the exploration of links with the behaviour of domestic and other animals observed at Downe and in other places. The works are foundation texts for human ethnology and developmental psychology with their behavioural and empirical approach.

The tangible context for his original scientific insight is clearly apparent. Darwin's home, gardens and many of the habitats and features in the surrounding farmed valleys which he examined and used, survive to reflect his ideas which we are able to access via extensive and comprehensive collections of Darwin's scientific writings including 12,000 letters and 60,000 pages of notebooks.

Due to there being no main roads or railway stations in the area it has escaped much of the twentieth-century development associated with London's hinterland and the landscape and buildings remain remarkably unchanged since Darwin's death.

> *'It is remarkable that we can walk in the historic woods and country around the village of Downe, just as Darwin did over one hundred years ago. It is essential that we maintain and protect the natural environment for our future generations'*, said Leader of Bromley Council, Councillor Stephen Carr.

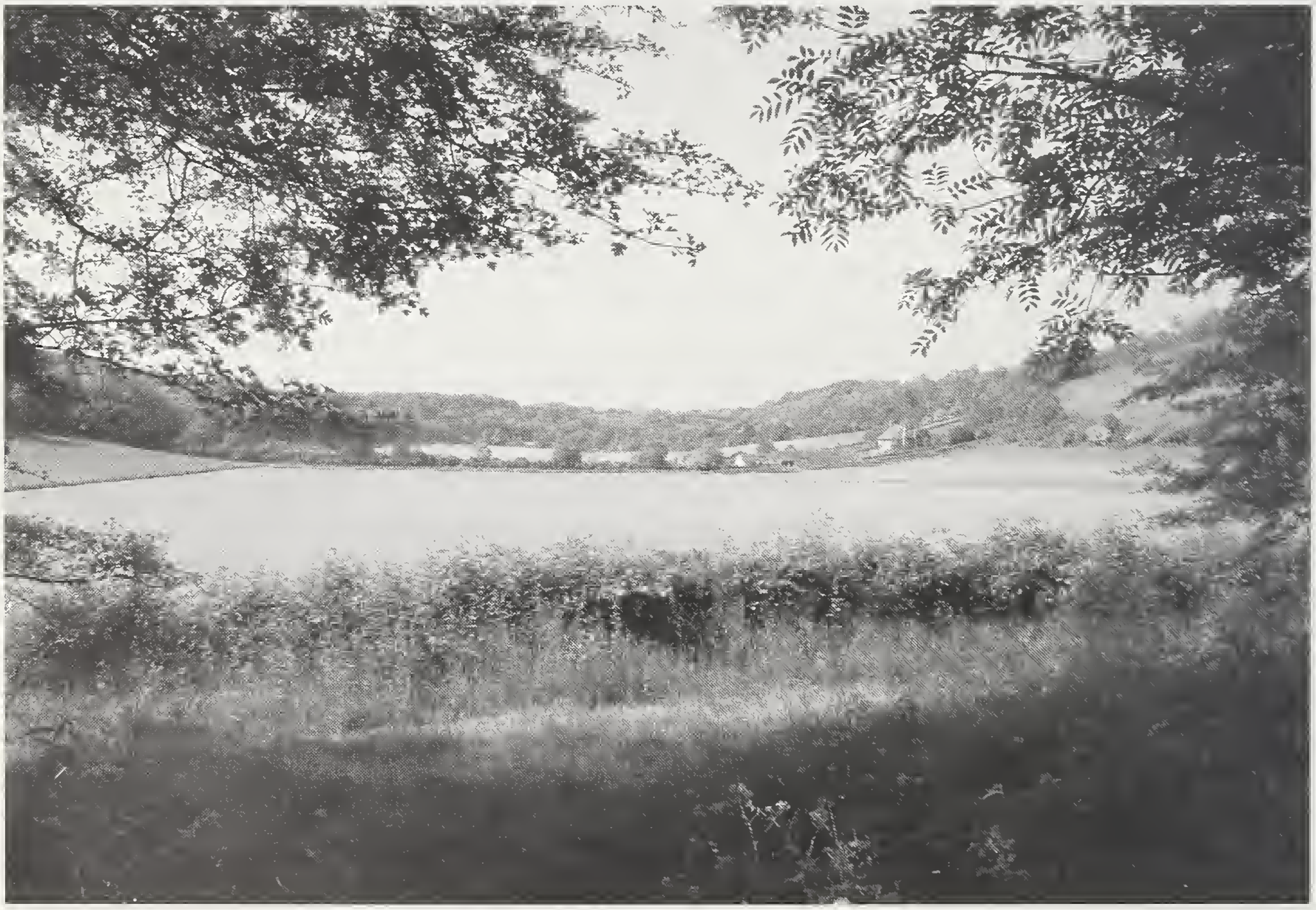

FIGURE 3. The Cudham Valley looking north. *Photo: Alister Hayes*

English Heritage, who own Darwin's home, Down House, celebrated the Bicentenary of Darwin's birth on 12 February 2009 by launching a new £1m exhibition on Darwin's work as well as a hand-held multimedia tour of the house and the gardens where he carried out many of his experiments. Given the high media profile Darwin is receiving, visitors are encouraged to attend using public transport.

A grant of £250,000 from the Heritage Lottery Fund (HLF) to Bromley Council is supporting public events, a Darwin Festival, skills and heritage training days and walks and talks in collaboration with experts and scientists. A schools work pack will be designed in time for the 150th anniversary of the publication of *The Origin of Species* on 24 November 2009 and 'Darwin Days' have been created for local schools.

Easy access to nearby London, and to the worldwide postal system, offered Darwin opportunities to test worldwide opinion of his developing theories from Down. The recognition of the importance of the universality of his theories required information and collaboration from fellow scientists around the world who then went on to replicate his experiments and verify his findings. The works that Darwin's Landscape Laboratory inspired, including *The Origin of Species,* are one of the greatest and most lasting testimonies to the value of international scientific cooperation.

Great Pucklands Meadow, at the back of Down House, has outstanding importance because it was here in 1855 that Darwin made the world's first focussed survey of every plant species.

> *'To show the degree of diversity in our British plants on a small plot . . . the field all consisted of heavy very bad clay, but one side sloped and was drier; there was no water or marsh. 142 phanerogamic plants were here collected by a friend during the course of a year; these belonged to 108 genera, and to 32 orders out of the 86 orders into which the plants of Britain have been classed'.* Charles Darwin, *Natural Selection* (1856–1858: 230).

The survey confirmed his expectation of the principle of divergence as a necessary factor for his theory first expressed in the long draft of *The Origin of Species.* As we move into 2010 and the UN's International Year of Biodiversity, it is worth remembering that Darwin gave us the structure, the science and the grammar of the world's present understanding of biodiversity.

Book review

British moths and butterflies: a photographic guide. Chris Manley. A&C Black. 2008. 352 pages. 234 × 154 mm. Paperback, £24.99. 2,500 colour photographs. ISBN 978 0 71368 636 4.

Chris Manley lives in Dorset and is an accomplished sculptor and photographer in addition to his interest in moths. His 2006 book, *Moths of Trigon — Observations on a Dorset Country Estate*, is a highly regarded and beautifully photographed account of the moths found in this area near to Poole. In his latest book, Chris has expanded his horizons to produce what I regard as a real breakthrough in Lepidoptera books. By using his own superb photographs and enlisting the help of many of Britain's best insect photographers, this is a major step forward and makes many of the existing guides look incomplete and very dated indeed.

There are already several highly regarded books in this field, so my enthusiasm for this book needs to be explained and justified. There are two main points which make this book such a winner for me: the photographs and the range of subjects covered. The photographs are of the very highest quality, showing each subject in its natural surroundings. They are well chosen to show many of the key identification features and are reproduced at a suitable and attractive size. Illustrated identification guides can be very pleasing and informative but, for me, a good field photograph is the best way to show colour, form and posture.

The second major plus point is the subject coverage. While other books cover just butterflies, or just macro moths or just caterpillars, this book covers 850 macro moths, 500 micro moths, and 74 butterflies, and also shows many caterpillars, eggs and pupae too. Of course, not every species is featured, and the accompanying text for each species is necessarily brief. Key information is provided however: log numbers based on Bradley's checklist, wingspan, scarcity, flight period, key identification features, distribution and habitats. Food plants are given for each species (including micro moths) and a useful summary of food plants of macro moths and butterflies is given as an appendix. From this we learn, for example, that the elegant sweet chestnut provides food for only a single macro lepidopteran species, whereas that the humble dandelion provide food for forty species! I would have liked it if the micro moths could have been included in the food plant summary too, as their food plants are included in the species accounts.

I enthusiastically recommend this book. For the expert, it will be a welcome and highly useful addition to the library, and for the beginner, it will provide an excellent starting point.

MICK MASSIE

Charles Darwin's lawn plot experiment

JANE McLAUCHLIN
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Abstract

Charles Darwin refers briefly to an experiment in *On the Origin of Species*, where competition is illustrated on his own lawn at his home at Down House. This experiment has been repeated at Down House and the results compared with Darwin's results.

Introduction

Charles Darwin lived at Down House in the village of Downe in Kent for forty years, from 1842 until his death in 1882. He unceasingly observed and carried out experiments in his large garden, resulting in nine books (not including those concerned with the *Beagle* voyage or with barnacles). He recorded in his notebooks many observations which remained unpublished or briefly referred to incidentally in the books.

Down House is now in the care of English Heritage and is open to visitors.

Charles Darwin's lawn plot experiment

In Chapter 3 of *On the Origin of Species*, 'Struggle for Existence', Darwin (1859) wrote:

> 'If turf which has long been mown, and the case would be the same with turf closely browsed by quadrupeds, be let to grow, the more vigorous plants gradually kill the less vigorous, though fully grown, plants; thus out of twenty species growing on a little plot of [mown*] turf (three feet by four) nine species perished from the other species being allowed to grow up freely.'

Darwin included this paragraph as part of his evidence to explain his ideas on the results of competition between different organisms. It is a brief summary of an experiment carried out in his garden in 1856 to 1858, which is described in detail in Darwin's notebook (Kohn and Keynes 2006). In 1856, after the lawn was mowed once or twice in spring, it was left unmown and he then recorded the plants growing in an area 3 feet × 4 feet. He recorded the plants in the plot on one occasion each year, and noted their state (Table 1). Darwin of course used the names in use at the time, and these can be traced through old floras to the current names. Additional names have been added to Darwin's notes in another hand. Two of these are probably misnomers: *Ranunculus auricomus* is a woodland buttercup and unlikely to be in the lawn, although it is now to be found elsewhere in the garden, in the Sandwalk. More likely are *Ranunculus repens* creeping buttercup or *Ranunculus acris* meadow buttercup, which are both found in Darwin's lawn. *Veronica agrestis* green field-speedwell, is a weed of cultivation or disturbed ground and other speedwells are more likely in a lawn.

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* Added in later editions.

TABLE 1. Plants recorded by Darwin.

	Darwin's name (text in **bold** is added in another hand)	Modern name	15.vii.1856	1.vi.1857	30.vii.1858
1	*Anthoxanthum odoratum*	*Anthoxanthum odoratum* sweet vernal-grass	Note added 1857	Y	Y?
2	*Trisetum flavescens*	*Trisetum flavescens* yellow oat-grass	Y	Y	Y
3	*Lolium perenne*	*Lolium perenne* rye grass	Y	Y	Y
4	*Cynosurus cristatus*	*Cynosurus cristatus* crested dog's-tail	Y	Y	Y?
5	*Phleum pratensis*	*Phleum pratense* timothy	Y	Y	Y?
5 bis	*Poa pratensis*	*Poa pratensis* smooth meadow-grass	Y	Y	Y
6	*Poa annua*	*Poa annua* annual meadow-grass	Y	Y	Y?
7	*Agrostis vulgaris*	*Agrostis capillaris* common bent	Y	Y	Y?
8	*Holcus*	*Holcus lanatus* Yorkshire fog	Y	Y	Y
9	*Ranunculus* ***auricomus***	Goldilocks buttercup, a woodland plant. More likely in the lawn is *R. repens*, creeping buttercup or *R. acris*, meadow buttercup.	Y	Y	Y
10	*Bellis perennis*	*Bellis perennis* daisy	Y	Not one daisy	
11	*Dandelion*	*Taraxacum officinale* agg. dandelion	Y	Y	Y
12	*Achillaea*	*Achillea millefolium* yarrow	Y	One half-dead leaf	
13	*Trifolium (white)* ***repens***	*Trifolium repens* white clover	Y	One half-dead leaf	
14	*Trifolium (yellow) minus*	*Trifolium dubium* lesser trefoil	Y		
15	*Sagina procumbens*	*Sagina procumbens* procumbent pearlwort	Y		
16	*Veronica* ***agrestis***	Green field-speedwell, a weed of cultivation. Other *Veronica* species more likely in the lawn.	Y		
17	*Plantago*	*Plantago* plantains	Y		
18	***Prunella vulgaris***	*Prunella vulgaris* selfheal	Y		
19/20	***Cerastium vulgatum***	*Cerastium fontanum* common mouse-ear	Y	½ dead, died soon	
Species			Total 20 Grasses 9, others 11	Total 14 Grasses 9, others 5	Total 11? Grasses 9? others 2
Changes				6 species lost	3 further losses

Modern names: translated from Darwin's names using Bentham & Hooker (7th edition, 1954), Hubbard (1968) and Stace (1997).

In 1856 Darwin counted nineteen species of plants, eight grasses and eleven others. He added another grass; on 17 May 1857 he made an additional note that *Anthoxanthum odoratum* must have been present in 1856. This is an early flowering grass and so he probably missed the flowers in the first year. In 1857 all the grasses were 'present and extremely vigorous', but of the other plants, only *Ranunculus* and dandelion were 'vigorous', with *Achillea, Trifolium* and *Cerastium* just surviving. Darwin noted that 'the luxuriant growth has killed nine species of plants', which presumably includes the half-dead *Achillea, Trifolium* and *Cerastium*. In the third year, 1858, he noted the presence of *Ranunculus*, dandelion and grasses. The only grasses he mentions by name are *Trisetum, Poa, Lolium* and *Holcus*, but his paragraph from *The Origin*, quoted above, implies that all the grasses were still present in that year.

Repeating the experiment

Darwin was not specific about where exactly in the garden he laid out this experiment, so it was re-created in two plots in different parts of the Down House lawn. The first plot, 3 feet × 4 feet, as described by Darwin, was laid out in 2005, on the regularly mown verge of the orchard to the north of the house. There is no indication in the notebook how the plot was marked out, but this one was fenced with a 20-cm woven hazel fence to prevent accidental mowing (Figure 1).

The plot was left for three years, with all growth and dead vegetation remaining undisturbed. Normal mowing was maintained on the surrounding lawn. The plants growing in the plot were recorded for three years, from 2005 to 2007. Plants were recorded on three occasions each year, between late March and July, and the results aggregated. Small plants were more visible on the early dates, and grasses were more visible later, in June and July when they are in flower. In spring 2008, the fence was removed and mowing was resumed. Plants were recorded in the summer of 2008 to ascertain whether the small plants had died out or had merely disappeared temporarily under the dead vegetation.

A second plot was laid out in 2006 on the back lawn to the south-west of the house and the plants recorded similarly from 2006 to 2008.

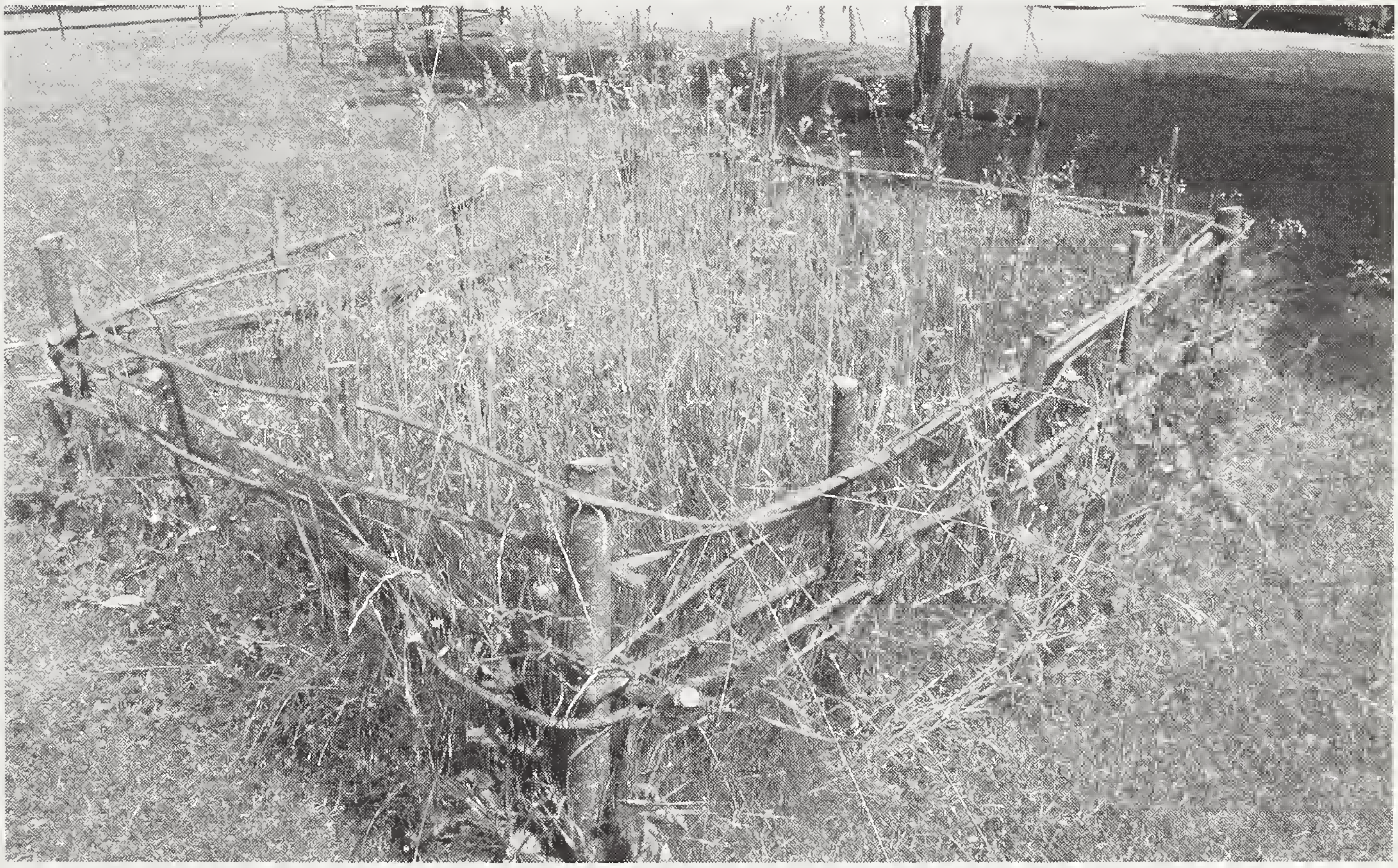

FIGURE 1. Darwin's lawn plot experiment: Plot 1, 22 June 2005. *Photo: Toby Beasley*

Results

(Table 2)

Plot 1. Orchard verge. Nineteen species were recorded in 2005, thirteen in common with Darwin's results (counting creeping buttercup as *Ranunculus* and thyme-leaved speedwell as *Veronica*). This is a good agreement after 150 years, and other species that Darwin recorded are growing nearby in the orchard, even though they were not present in this particular plot (*Anthoxanthum odoratum, Cynosurus cristatus, Lolium perenne, Plantago lanceolata* and *Sagina procumbens*).

Eleven of these species were found again in 2006, with four new ones. The eight species not refound include four very low species, *Poa annua, Bellis perennis, Ranunculus ficaria* and *Veronica serpyllifolia*. An ants' nest about 30 cm diameter and 25 cm high appeared in the centre of the plot. The vegetation grew extremely thick and tall during the first summer. The hazel fence kept the dead stalks upright over the winter and resulted in a thick thatch of dead stems and leaves, mostly from the grasses, covering the plot.

The species count remained at fifteen in 2007. Another low-growing species, *Prunella vulgaris*, was not found. *Veronica serpyllifolia* reappeared, but only on the raised mound of the anthill. Two grasses, *Agrostis capillaris* and *Lolium perenne*, were not recorded. They may have been not present or just not flowering, but *Lolium* leaves are quite distinctive and would have been noticeable. A new plant, hogweed *Heracleum sphondylium*, was recorded. This is a large robust plant which is often found in rough grassland. It would be mown off when very small in a lawn. The sward height reached 60 cm.

Twelve non-grass species were present in 2008. The grasses were not recorded as the plot was mown to 3 cm in height. The low-growing daisy, selfheal and speedwell reappeared, the last not only on the anthill. Hogweed persisted, but only as a mown-off stump. The plot was still recognizable in spite of the removal of the fence, with mown-off grass bases and stems in contrast to the green blades of the surrounding continuously mown grass. The anthill was flattened but the characteristic crumbly soil was still visible.

Plot 2. Back lawn. Sixteen species were recorded in 2006, nine in common with Darwin's results, and ten in common with the plants found in Plot 1. This plot was much less grassy in appearance than Plot 1. It was near a yew tree and was partially shaded and dry.

Only six species were recorded in 2007. Again, the low-growing species (*Bellis perennis, Poa annua, Sagina procumbens, Trifolium repens* and *Veronica serpyllifolia*) were not found.

The species count increased to eight in 2008, with two additional grasses. The sward height reached 30 cm.

Discussion

The results agree generally with Darwin's findings, as small low plant species were not recorded, even after one year in both plots. The remaining plants became tall and vigorous. The further decline in species in the third year seen by Darwin was not repeated so markedly in these plots. Darwin found that the grasses remained and most of the other plants disappeared, whereas here, there was a higher proportion of non-grass species and more of these persisted. New plants were also recorded, although Darwin only found losses and no gains.

The two plots have different species, but taking only one sample may not be representative of the whole lawn in each case. Modern ecologists would perhaps take ten one-metre-square quadrats (comparable in area to Darwin's 3 ft × 4 ft plots) from each lawn to make sure the results are representative. The Down House lawns are managed only by mowing and are full of 'lawn weeds', i.e. varied and attractive non-grass plants. Differences between the two plots and Darwin's results are likely to be due to variability in the composition of the lawn.

TABLE 2. Plants recorded in modern experiments.

Plot 1 (orchard verge)

		2005	2006	2007	2008
Achillea millefolium	Yarrow	Y	Y	Y	Y
Agrostis capillaris	Common bent		Y		
Bellis perennis	Daisy	Y			Y
Cardamine pratensis	Cuckooflower	Y	Y	Y	Y
Cerastium fontanum	Common mouse-ear	Y	Y		Y
Festuca rubra	Red fescue	Y		Y	
Galium aparine	Cleavers		Y	Y	
Heracleum sphondylium	Hogweed			Y	Y
Holcus lanatus	Yorkshire fog	Y	Y	Y	
Hypochaeris radicata	Cat's-ear		Y	Y	Y
Leontodon saxatilis	Lesser hawkbit		Y		
Lolium perenne	Rye grass	Y	Y		
Poa annua	Annual meadow-grass	Y			
Poa pratensis	Smooth meadow-grass	Y		Y	
Poa trivialis	Rough meadow-grass	Y	Y	Y	
Prunella vulgaris	Selfheal	Y	Y		Y
Ranunculus ficaria	Lesser celandine	Y			
Ranunculus repens	Creeping buttercup	Y	Y	Y	Y
Rumex acetosa	Common sorrel	Y			
Stellaria graminea	Lesser stitchwort	Y	Y	Y	Y
Stellaria media	Common chickweed	Y		Y	
Taraxacum officinale agg.	Dandelion	Y	Y	Y	Y
Trifolium repens	White clover	Y	Y	Y	Y
Veronica serpyllifolia	Thyme-leaved speedwell	Y		Y	Y
Sward height cm				60	3 (mown)
Species		Total 19 Grasses 6, others 13	Total 15 Grasses 4, others 11	Total 15 Grasses 4, others 11	Total 12 (not including grasses)
Changes			8 species lost, 4 gained	5 further losses, 4 reappeared, 1 gained	

TABLE 2 continued

Plot 2 (back lawn)

			2006	2007	2008
Agrostis capillaris	Common bent		Y		Y
Anthriscus sylvestris	Cow parsley		Y		
Bellis perennis	Daisy		Y		
Cardamine pratensis	Cuckooflower		Y	Y	Y
Holcus lanatus	Yorkshire fog		Y	Y	Y
Leontodon hispidus	Rough hawkbit		Y		
Leontodon saxatilis	Lesser hawkbit		Y		
Lolium perenne	Rye grass		Y		
Plantago lanceolata	Ribwort plantain		Y	Y	Y
Poa annua	Annual meadow-grass		Y		
Poa trivialis	Rough meadow-grass				Y
Ranunculus acris	Meadow buttercup		Y	Y	Y
Ranunculus repens	Creeping buttercup		Y	Y	Y
Sagina procumbens	Procumbent pearlwort		Y		
Taraxacum officinale agg.	Dandelion		Y	Y	Y
Trifolium repens	White clover		Y		
Veronica serpyllifolia	Thyme-leaved speedwell		Y		
Sward height cm					30
Species			Total 16 Grasses 4, others 12	Total 6 Grasses 1, others 5	Total 8 Grasses 3, others 5
Changes				10 species lost	0 further losses, 1 reappeared, 1 gained

After resuming mowing of Plot 1, three of the low-growing species, daisy, common mouse-ear and selfheal, immediately returned. Although some large plants remained, such as the single hogweed, this is unlikely to survive regular mowing. The plot did not revert instantly to smooth green mown lawn as it had been before the experiment; it was still distinguishable from the surrounds in year four. Low-growing plants could return by (i) being there all the time but not visible in the tall vegetation (perennials), or by (ii) seed already in the soil and germinating when conditions suitable (annuals), or (iii) colonization (seed/vegetative spread) from the surrounding lawn when the habitat becomes suitable again. The plants recorded in these plots are successful lawn weeds, found in profusion in the Down House lawns and will not easily be permanently removed!

Darwin did not record how he marked out his plots. The hazel fences used for the modern plots ensured that they were not accidentally mown, and made the experiment visible and attractive to visitors. The fences allowed leaves and debris to collect between the unmown plants, and if Darwin's gardener could reliably run his mower around unfenced plots, this might affect the outcome of the experiment.

Further plots are planned to illustrate the experiment to visitors, and these will provide more results.

Acknowledgements

Grateful thanks to Toby Beasley (formerly head gardener at Down House) and Randal Keynes for suggesting the experiment, for laying out the plots and for providing copies of and transcriptions of the relevant parts of Darwin's notebooks.

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Book review

Mike Dennis. Distributed by Lopinga Books, Tye Green House, Wimbish, Essex CB10 2XE. 2009. 73 pp., softback A5, £6. ISBN 0 9530362 8 8.

This is a 'memorial publication celebrating the life of Mike Dennis, and especially his contribution to the understanding and conservation of birds in his local patch of Havering and east London.' So the subtitle of this book states, below a photograph of a smiling Mike.

Mike died on 11 August 2006 at the age of fifty-six following a short illness. He joined the London Natural History Society in 1976 and was well respected as a long-serving officer and bird recorder. He was especially interested in Hainault Forest, the Ingrebourne Valley and Rainham Marshes. At our conference 'The Thames Revisited' in October 2000, Mike presented a paper on 'The birds of the Inner Thames — an avian highway', in which he showed how significantly London's river affects the birdlife of the capital. This was published in *The London Naturalist* **80** (2001).

The present publication describes in detail how Mike was 'a man of many parts'. As an educator, he shared his love of wildlife and the environment with all the children who came under his care during his thirty-five years of teaching. He was an inspiring friend to many Essex birders. Our obituary to Mike, which appeared in the *The London Naturalist* **86** in 2007, was written by one of these friends, Adrian Dally. Most importantly, in modern times, Mike was an avid conservationist. However, birds were his lifetime passion. He published many articles and reports. He surveyed the breeding birds of Hainault Forest from 1964 to 2003, studying especially individual species such as green woodpecker and the warblers. Mike was passionate about the conservation of Rainham Marshes in particular, and here he did pioneering work on recording the breeding birds for over twenty-five years.

The publishers — Mike's friends and family — are to be congratulated in producing this timely volume as a fitting memorial to Mike's valuable contribution to Essex ornithology.

K. H. Hyatt

An associated CD of bird records is available to LNHS members by contacting any one of the email addresses on page ii of the book, and then sending 90p in postage stamps to the address given in reply, enclosing a donation by cheque to the London Natural History Society as one of the charities that Mike supported. Ed.

Goat's-beard colony in Kensington Gardens

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In June 2008 hundreds of flowering plants of *Tragopogon pratensis* ssp. *minor* goat's-beard were noticed on Buck Hill in Kensington Gardens, across the water from Peter Pan. At the beginning of May 2009 they reappeared and again flowered in strength. This is a common British weed of rough grassland, but Inner London records of previous appearances refer only to random individual plants, none of which occurred here. This colony seems to have evolved imperceptibly over a number of seasons as mowing regimes were modified.

Goat's-beard is a yellow-flowered member of the family Asteraceae. Two subspecies of *T. pratensis* occur in Britain, the native ssp. *minor*, and ssp. *pratensis*, an established alien — both widespread throughout Europe. These have most characteristics in common, but are clearly distinguishable by the lengths of the sepal-like bracts encircling the yellow ligules. In ssp. *minor* these are conspicuously longer than the ligules, while in ssp. *pratensis* they are about equal in length. Previous London records have not always differentiated between these subspecies.

Goat's-beard can easily be overlooked, although it may be up to a metre tall. Its stems and leaves are inconspicuous among coarse grasses and its flowers are sporadic and not showy. In addition, its blossoms fold and droop around midday (hence the common name of 'go-to-bed-at-noon'), making the plant virtually invisible during afternoons. Only the large brownish seed-heads persist to catch the eye.

During 2008 and 2009 the main concentrations of goat's-beard appeared in two patches on the unmown eastern slope of Buck Hill. One (TQ269805) was close to the summerhouse and the other (TQ268806) a short distance further north, each containing hundreds of plants. Individual plants also appeared randomly on other marginal rough grassy parts of the hill. Colonization by this attractive plant is a welcome addition to Buck Hill, already noted for the unusual diversity of its flora.

Acknowledgements

I am grateful to Rodney Burton and Mark Spencer for helpful comments, and to Sylvia Reynolds for recording grid references.

Book review

Natural selection and beyond. The intellectual legacy of Alfred Russel Wallace. Edited by Charles H. Smith and George Beccaloni. Oxford University Press. 2008. 482 pp., hardback, £30. ISBN 978 0 19 923916 0.

When the joint papers on natural selection by Charles Darwin and Alfred Russel Wallace were read at The Linnean Society of London on 1 July 1858, neither author was present. Darwin was at Down House as his infant son Charles Waring had died of scarlet fever just three days previously, and Wallace was in the Dutch East Indies.

Darwin had been working for many years on his theory of natural selection but had been reticent to publish despite being repeatedly urged to do so. When, however, he received a letter from Wallace who was in the Far East he was shaken. Wallace had come up with the same ideas as himself. Darwin consulted Hooker and Lyell and they proposed that the papers be presented simultaneously to The Linnean Society. This was duly done. But then the modest Wallace faded into obscurity, largely as he was still overseas, and just Darwin and Darwinism remained in the public memory. Interestingly, it was Wallace who popularized the term 'Darwinism'.

For many decades, Wallace's fame and influence in Victorian society were rarely recognized. He had become a forgotten figure. In recent years, a number of well-meaning authors have contrived to rectify this and in so doing have largely ignored their predecessors' efforts, with the result that several excellent biographies of Wallace have appeared.

As its subtitle suggests, however, the present volume is more than a biography in the traditional sense. It is a collection of essays, almost all specially commissioned to bring together in-depth analyses of various aspects of Wallace's life, thoughts and work, and contributed by distinguished historians, biologists, conservationists, anthropologists, a geologist and a literary critic. These essays go much deeper into Wallace's interests and concerns than have the biographies referred to above which by their nature have at times been brief. They place Wallace into his wider historical context in Victorian society. What emerges is a picture of a remarkable polymathic and deeply humane man whose work and ideas continue to exert their influence, not only in evolutionary biology and biogeography, but in contemporary concerns with conservation and sustainable development.

Of the editors of this impressive compilation, Charles Smith is Science Librarian and Professor of Public Services at Western Kentucky University. He has been involved in studies on Wallace for nearly thirty years. George Beccaloni is an evolutionary biologist and entomologist at the Natural History Museum in London. In 1999 he founded the A. R. Wallace Memorial Fund, which has restored Wallace's grave and erected monuments at his birthplace in Usk, Monmouthshire and elsewhere.

I feel that we can now say that Alfred Russel Wallace has been firmly restored to his rightful place in science and history, and that his work and ideas are fully documented.

K. H. Hyatt

The Lepidoptera of Blackheath and Greenwich Park, 1800–2009

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Abstract

An historical account is presented of the Lepidoptera of the Blackheath district and adjacent Greenwich Park, lying within the south-eastern London suburbs, covering the years 1800 to 2009. The results of a special survey of the Lepidoptera of the Park, commissioned by the Friends of Greenwich Park, and carried out by T.H. Freed during the years 2004–2006 are included.

Following the introduction, a brief historical account is provided of the habitats of the area, together with specific mention of some of the notable entomologists of the past who recorded Lepidoptera there. This is followed by the main part of the paper, consisting of a systematic account of the species recorded from about 1800 to September 2009.

Altogether, 28 species of butterflies and 692 species of moths have been recorded during this period, making a grand Lepidoptera total of 720 species. In his recent survey, THF recorded in Greenwich Park 16 species of butterflies and 352 of moths, the majority of the latter through the use of two 125-watt Robinson-type mercury-vapour light traps, one sited in the Bird Sanctuary in the south of the Park and the other on the roof of the Plant Room at the Old Royal Observatory in the centre. Daytime sampling by THF recorded 57 moth species, eight as adults and 49 as larvae and leaf-mines. In addition, THF and others have added 13 species during further surveys in 2008 and 2009. The all-time total for Greenwich Park stands at 26 species of butterflies and 477 of moths.

Species of conservation significance are indicated by status category abbreviations following their scientific names in the systematic section.

Introduction

The survey of Greenwich Park's Lepidoptera carried out during the years 2004–2006 by T.H. Freed (THF) (2004, 2006*a*, *b*) prompted J.F. Burton (JFB) to assemble his records of Lepidoptera made in the Park and at Blackheath, mainly in the 1940s and 1950s, plus the records of other observers in the period 1800 to 2000 of which he was aware. Moreover, this decision was reinforced by the formation in early 2001 of the Greenwich Park Wildlife Group under the leadership of, successively, Mrs Lucy Chandler, Mrs Elaine Worrall, the late Alan Mills, Mrs Ann Hutchinson, and currently, Mrs Sue Yates.

THF has been actively surveying Lepidoptera in London's Royal Parks since 1993. His survey at Greenwich (Freed 2006*a*) was commissioned in 2003 by The Friends of Greenwich Park in agreement with The Royal Parks, and was timed to coincide with a new management scheme to encourage more flora and fauna in the Park's grasslands, particularly acid grassland. The three largest areas of the latter are on Croom's Hill, part of the escarpment below General Wolfe's statue near the Old Royal Observatory, and around One Tree Hill.

The initial survey proposal was for eight daytime visits for butterflies, and eight overnight visits for moths. The butterfly survey was straightforward, involving visits on favourable days to suitable habitats, as well as designing a Butterfly Transect Walk to monitor areas of grassland in the new management scheme. In the event two routes were set up, the first based around One Tree Hill where the experimental leaving of long grass has been practised since about 1995, and the second around Croom's Hill. Casual surveying was also to be undertaken throughout the Park, additionally noting butterfly nectar and larval hostplants, as well as day-flying moths.

The moth survey carried some restrictions: the two Robinson traps had to be left overnight in locations which were secure from public interference, as well as being favourable for moth collecting. Two well-separated sites were chosen: one in the small paddock outside the Secret Garden Wildlife Centre (adjacent to the Middle Bird Sanctuary) and the other at the Old Royal Observatory high up on the roof of the Plant Room. Co-ordinating survey visits with favourable conditions for moth activity, and accessibility to the Park at night, proved tricky on a few occasions, and it became necessary to carry the survey into 2005 in order to cover periods missed in 2004. Following the capture of several rare and interesting species, the Friends of Greenwich Park kindly agreed to fund two further visits. These, together with some leaf-mine collecting on 12 October 2006 in the company of D.J.L. Agassiz (DJLA), produced many more species including several rarities (Freed 2006*a*).

JFB lived in the Borough of Greenwich from 1943 until 1959, apart from spells away from home in the army and at Oxford. When living at home in nearby Charlton or visiting the district he made frequent visits to both Blackheath and Greenwich Park to study the wildlife, and eventually his observations on the vertebrate fauna were published in this journal (Burton 2001). He was sometimes accompanied on these visits by K.H. Hyatt and the late D.F. Owen (who also made their own collections), and we are glad to be able to include their records as well, the latter through the kindness of Mrs Clare Owen, who allowed JFB to borrow her late husband's journals covering the 1940s and 1950s. We have also been able to include some records made by A.A. Allen, who regularly ran a mercury-vapour light trap in his garden when he lived at Blackheath Park and who studied other insect orders as well as the Lepidoptera. Observations on the Lepidoptera supplied to de Worms (1950, 1953–58) by Hyatt, Owen and JFB were also included by that author in his papers for this journal. Records for Greenwich Park prior to 1910 were published by Webster (1902), West (1906) and Grinling et al. (1909) and summarized by de Worms. Webster (1902) merely contains a list of species supplied by Stanley Edwards, who lived at Blackheath.

THF's survey from 2004 to 2006 identified 352 species of moths and 16 of butterflies in Greenwich Park and was published privately as a report to the Friends of Greenwich Park. As far as we know, nobody has previously operated a mercury-vapour light trap in the Park. Prior to this recent survey, the present paper provides details of the observations of JFB and his contemporaries, mainly from the 1940s and 1950s, who were not then in a position to use mercury-vapour light traps and also did not have access to Greenwich Park after the gates were closed to the public for the night. In addition, observations of other entomologists have been gleaned from a reasonably thorough search of the available published literature.

Also included in this paper are some initial findings of a three-visit moth survey carried out in 2009 by Jon Clifton to evaluate the impact of proposed landscape changes in Greenwich Park for the 2012 Olympic Games. Significant records from a public event led by Harry Whitehead in the Park's Middle Bird Sanctuary on 25 September 2009 are also given.

Adding together all the species reliably recorded in the area from 1800 to September 2009 gives a total of 720 species of Lepidoptera, comprising 692 moths and 28 butterflies. All-time totals for Greenwich Park are: 477 species of moths and 26 of butterflies. A further eight species which were artificially introduced to the study area or are of doubtful origin have also been noted in this paper.

The history and habitats of the area

Comprehensive accounts, with maps and photographs, have previously been published by Grant (1967), Rhind (1987, 2002), Swales et al. (1989), and Teagle (1997). Burton (2001) added extra information, especially concerning the areas of most interest to the naturalist. Although that paper was primarily about the birds and other vertebrates, the habitats he described were and continue to be of value to insect life. In the 1940s, Blackheath and Greenwich Park were still, despite increasing urbanization, linked by a relatively unbuilt-on strip of countryside to Shooters Hill and the then more or less open Kentish countryside beyond — a wildlife corridor (see Burton 2001).

At the time of its original enclosure in 1433, Greenwich Park probably possessed a typically dry oakwood insect fauna also intermixed with that characteristic of the dry birch, gorse, broom and heather type of heath which formerly flourished over much of neighbouring Blackheath until the nineteenth century. Insect populations of both habitat types survive where suitable habitat exists, but nowadays those associated with cultivation and ruderal vegetation predominate. The enclosure of Greenwich Park was completed in 1619 with a strong wall which still stands today. The existing bird sanctuary enclosures of the Wilderness area are derived from coppices of ash, birch, hawthorn and privet planted in 1661–1662, and, because of the development of thick undergrowth by the 1940s, these were to some extent thinned out during the 1950s and followed by the planting of shrubs. Subsequently, unsuitable horticultural shrubs, such as roses and rhododendrons were unfortunately added (Freed 2006*a*). The once extensive bracken cover in the *c.*5.2 hectares of the Wilderness, which was eradicated by the Park authorities in the 1960s, has now been replaced to a large extent by stinging nettles (Burton 2001, Freed 2006*a*).

In the 1940s and 1950s, and probably even later, the grassland in the Park was rigorously manicured, but in recent years greater interest has been taken by the park authorities in the wildlife and the natural vegetation has been sympathetically managed in such a way in some areas, such as on One Tree Hill and on top of the Reservoir, as to allow the flora and fauna to flourish. This policy has already brought gratifying benefits in this respect. The Friends of Greenwich Park Wildlife Group is actively supporting these conservation measures and, together with the Park's management team, are to be congratulated on their admirable efforts. The covered Reservoir is of unusual interest in that although it is isolated from other good insect and plant habitats in the area, it is large enough to support an interesting diversity of species. When JFB lived in the Borough of Greenwich access to the top of the Reservoir was barred to the public, but some time before 2000 the site was opened up. When he visited it in May 2000 he was impressed by the flora to be seen there; especially the abundance of common stork's-bill *Geranium cicutarium* (which he had never seen elsewhere in the Park), dove's-foot crane's-bill *Geranium molle*, common bird's-foot trefoil *Lotus corniculatus*, oxeye daisy *Leucanthemum vulgare*, ribwort plantain *Plantago lanceolata*, and sheep's sorrel *Rumex acetosella*, plus such grasses as early hair-grass *Aira praecox*, meadow foxtail *Alopecurus pratensis,* sweet vernal-grass *Anthoxanthum odoratum* and Yorkshire fog *Holcus lanatus.* A list of the flora found at the Reservoir is given by Freed (2006*a*), who noted that the dense shrubbery that formerly circumnavigated this site, affording shelter and seclusion, was greatly reduced after he had completed his Lepidoptera survey.

Around the turn of the nineteenth and twentieth centuries the south-east London/north-west Kent area was well served by lepidopterists. Such leading lights as H.T. Stainton (1822–1892), William West (1836–1920), A.B. Farn (1841–1921), Robert Adkin (1849–1935), J.W. Tutt (1858–1911) and L.W. Newman (1873–1949) were very active in the field, and at that time, despite the spread of London's suburbs, there was still a good deal of open country for them to explore and enjoy. Greenwich Marshes was not yet covered with industrial development and was a rich source of marshland insects, while Blackheath still retained green links with the then unbuilt-on countryside at Kidbrooke and Charlton. In J.W. Tutt's foreword to the paper by William West (1906), he wrote: 'In 1878, Greenwich was still, in measure, cut off from New Cross, Charlton was an isolated village, Plumstead was yet in babyhood, and the country around was still country in the best sense. Westcombe Park was unopened, and only a single pathway led through it. The old West Combe House was still the solitary building therein, and Westcombe Hill [where Tutt himself resided] contained a dairy-farm and six houses, whilst its hawthorn hedges and mighty elm-trees were the glory of the district . . . . The gradual, but mighty, change leads one to wonder whether, some day, the entomologists of the future will be inclined to doubt the records of the work done in what must now even seem such impossible places. When we assert that we preferred to spend a summer holiday at home, to entomologise on Greenwich marshes, knowing that the insects to be obtained there were ofttimes better than from far-distant places with excellent entomological reputations, we shall scarce be believed . . . . Now the face of these places is wholly altered; London — close, thick, impenetrable — is everywhere, Ichabod is written in gloomy characters, entomologically, over all our old haunts, and one now has to go further afield to fare worse, and to live largely on the recollections of the departed glories of Greenwich, Blackheath, and the neighbourhood.'

Lepidoptera species accounts

The findings of the old lepidopterists were summarized in Grinling et al. (1909). Many common species were simply described in such terms as 'generally abundant', 'abundant everywhere', 'abundant' or 'common' in the south-east London area and therefore implied that this included Blackheath and Greenwich Park. However, we have decided to include such entries on the assumption that it is highly likely that this was the case. Westcombe Park is treated here as a north-eastern extension of Blackheath and therefore included. Adjacent districts (e.g. Charlton and Lewisham) have been incorporated where considered relevant. As references to Grinling et al. (1909), Fenn (1895), Webster (1902) and West (1906) appear repeatedly, we have generally omitted giving the dates of publication. Regarding dates and locations cited in THF's moth survey of Greenwich Park, where neither the 'Bird Sanctuary' nor the 'Observatory' is specified, it follows that a species was recorded at both sites on at least one or more of the dates given.

We have followed the scientific nomenclature and ordering used by Bradley (2000); however some changes have arisen since then and have been noted where appropriate. The checklist produced by Heslop (1964) proved very useful in identifying the species intended by the out-dated scientific names used in Fenn (1895), West (1906) and Grinling et al. (1909). Status categorisation of moths is under constant revision. This is especially true for many micromoth species, which have generally been under-recorded, and whose current status is unknown, whilst the status of others may have changed recently as new information comes to light. National conservation status is indicated by the following abbreviations:

L:	local, recorded from 101–300 ten-km squares in Great Britain since 1 January 1960.
Na:	Nationally Scarce A, recorded from 16–30 ten-km squares in Great Britain since 1 January 1980.
Nb:	Nationally Scarce B, recorded from 31–100 ten-km squares in Great Britain since 1 January 1980.
Notable:	Nationally Scarce species estimated to occur in 16–100 ten-km squares in Great Britain.
RDB2:	Red Data Book Category 2. Vulnerable: known from 15 or fewer ten-km squares in Great Britain.
RDB3:	Red Data Book Category 3. Rare: known from 15 or fewer ten-km squares in Great Britain.
pRDB:	denotes a species proposed for inclusion in the next Red Data Book listing due to current rates of decline.

Entries concerning eight species either doubtfully reported as occurring naturally, or which were artificially introduced into the area, are contained within square brackets [ ].

Moths (Microlepidoptera)

ERIOCRANIIDAE

Eriocrania subpurpurella (Haworth)

J. Clifton found leaf-mines in Greenwich Park on 21 May 2009.

HEPIALIDAE

Hepialus humuli (Linnaeus) GHOST MOTH

Reported by Tutt in Grinling, to be abundant at Blackheath. K.H. Hyatt caught a female there in 1946 and D.F. Owen (pers. comm.) recorded several on garden bomb-sites on the Lewisham side of Blackheath in June 1947. Allen (1970*b*) stated that ghost moths were still common in the Blackheath district at that date.

Hepialus sylvina (Linnaeus) ORANGE SWIFT

The only record known to us is A.A. Allen's (1970*b*) capture of a female at m.v. light at Blackheath Park on 26 June 1970.

Hepialus lupulinus (Linnaeus) COMMON SWIFT

Reported to be common at Blackheath by Tutt in Grinling and seen by JFB in plenty on Blackheath itself at dusk on 2 June 1949. This species was still common there in the 1960s (Allen 1970*b*). In Greenwich Park J.E. Owen found an imago at rest on a pine trunk on 2 June 1947 (per D.F. Owen) and K.H. Hyatt caught a specimen at light at Blackheath on 4 June 1958. Much more recently THF trapped one in the Park on 17 May, and four on 7 June 2004.

NEPTICULIDAE

Ectoedemia decentella (Herrich-Schäffer) **L**

Reported by Allen (1971) to occur 'regularly and far from uncommonly at light' at Blackheath, where he also saw it on sycamore trunks. The only recent record is of one taken by THF at m.v. light at the Bird Sanctuary in Greenwich Park on 7 June 2004.

Ectoedemia louisella (Sircom) (*sphendamni*)

Allen (1971) reported capturing two imagines at m.v. light at Blackheath in 1959: a male on 19 July and a female on 6 August.

Ectoedemia atricollis (Stainton)

On 12 October 2006 a larval leaf-mine of this species was found by DJLA and THF in Greenwich Park.

Ectoedemia heringella (Mariani)
Leaf-mines were found by THF in Greenwich Park on 12 April and 12 October 2006.

Ectoedemia subbimaculella (Haworth)
The only record is of an imago captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 23 June 2005. In Grinling it was reported as 'uncommon' at nearby Lewisham.

Ectoedemia septembrella (Stainton)
This species was also reported from Lewisham in Grinling. DJLA and THF found a leaf-mine in Greenwich Park on 12 October 2006.

Stigmella aurella (Fabricius)
Recorded by Tutt at 'Westcombe Park, etc.', by Stainton at Lewisham and by B.A. Bower as 'generally abundant' in south-east London (Grinling). The only recent record is the leaf-mine found by THF in Greenwich Park on 12 April 2006.

Stigmella lemniscella (Zeller)
DJLA and THF found a leaf-mine of this moth in Greenwich Park on 12 October 2006 — the only record.

Stigmella speciosa (Frey)
Allen (1971) reported finding mines sparingly in the leaves of sycamore saplings in his garden at Blackheath Park during the 1960s. DJLA and THF found leaf-mines in Greenwich Park on 12 October 2006.

Stigmella salicis (Stainton)
Stated in Grinling to be common in the SE London area and recorded by Stainton from Lewisham, a leaf-mine of this species was found by DJLA and THF in Greenwich Park on 12 October 2006.

Stigmella floslactella (Haworth)
Reported in Grinling by Stainton to be common at Lewisham and by Tutt at Westcombe Park, etc. Much more recently, DJLA and THF found a leaf-mine in Greenwich Park on 12 October 2006.

Stigmella tityrella (Stainton)
Stated in Grinling to be abundant, DJLA and THF found a leaf-mine in Greenwich Park on 12 October 2006.

Stigmella suberivora (Stainton)
Found by DJLA and THF in Greenwich Park as a leaf-mine on 12 October 2006 — the only record.

Stigmella roborella (Johansson) **L**
As the last species.

Stigmella samiatella (Zeller) **pRDB3**
As the last two species.

Stigmella basiguttella (Heinemann)
As the last three species.

Stigmella oxyacanthella (Stainton)
Reported in Grinling from Westcombe Park, Lewisham and nearby Charlton. No recent reports.

Stigmella aceris (Frey) **pRDB2**
Found by DJLA and THF in Greenwich Park as a leaf-mine on 12 October 2006 — the only record.

Stigmella microtheriella (Stainton)
Stated in Grinling to be abundant and reported from Lewisham by Stainton. DJLA and THF found a leaf-mine in Greenwich Park on 12 October 2006.

Stigmella sakhalinella (Puplesis)
The only record is of a larval leaf-mine found by DJLA and THF in Greenwich Park on 12 October 2006.

OPOSTEGIDAE

Opostega salaciella (Treitschke)
The only record is of an imago captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

TISCHERIIDAE

Tischeria ekebladella (Bjerkander)
THF captured one imago at m.v. light at the Bird Sanctuary site in Greenwich Park on 23 June 2005 and saw others there.

Emmetia marginea (Haworth)
Described as abundant in the SE London area in Grinling. Two imagines captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 7 June 2004.

INCURVARIIDAE

Lampronia corticella (*rubiella*) (Linnaeus) RASPBERRY MOTH
Described by Tutt in Grinling as abundant and reported by him from Westcombe Park. We are unaware of any subsequent records.

Nematopogon swammerdamella (Linnaeus) SWAMMERDAM'S LONGHORN
Reported 'sparingly' by Robert Adkin from Lewisham in Grinling.

Nemophora fasciella (Fabricius) **Na** COPPER-JAPAN LONGHORN
On 30 July 1977, A.A. Allen (1978) saw a fresh female of this moth on the flowerhead of yarrow *Achillea millefolium*, close to its larval foodplant black horehound *Ballota nigra*, in a large fallow field very near his then home at Blackheath Park.

Nemophora degeerella (Linnaeus) DE GEER'S LONGHORN
Reported in Grinling from Lewisham and from Greenwich Park by THF, who caught one at m.v. light at the Bird Sanctuary site on 7 June 2004.

HELIOZELIDAE

Heliozela sericiella (Haworth)
Described by B.A. Bower in Grinling as 'generally abundant' in the SE London area. No later reports.

COSSIDAE

Zeuzera pyrina (Linnaeus) LEOPARD MOTH
Of this species, C.G. Barrett (1893–1907) stated that 'At Blackheath the destruction of good-sized elm-trees has been attributed to the abundance of its larvae.' W. West (1906) reported finding the larvae in hawthorn and apple trees. In the late 1940s and in the 1950s larvae and pupae of this moth were plentiful in the often decayed boughs of the ancient sweet chestnut trees in Greenwich Park. JFB and D.F. Owen sometimes found imagines there, such as the female found at rest on the trunk of a sweet chestnut in the Large Bird Sanctuary on 14 July 1949, in the close vicinity of which THF caught one at m.v. light on 23 June 2005. On 26 December 1951, JFB discovered many pupae under the loose bark of sweet chestnut trees in the Park. At Blackheath Park on 4 July 1960, A.A. Allen (1970*b*) recorded eleven males at his m.v. light trap; he had never seen them before, but subsequently trapped a female there on 26 June 1970.

Cossus cossus (Linnaeus) **Nb** GOAT MOTH
On 26 September 1946 a fully grown larva was brought to JFB by a schoolfellow who found it wandering on the ground in Greenwich Park, presumably in search of a pupation site. As reported in Plant (1993), A.A. Allen found an oak at Blackheath in May 1984 that contained larvae of this species.

ZYGAENIDAE

Zygaena filipendulae (Linnaeus) SIX-SPOT BURNET
A.A. Allen (1967, 1970*a*) saw occasional imagines of this burnet in his garden at Blackheath Park in August most years from 1960, where they favoured the flowerheads of knapweeds and thistles. On 28 July 1971 JFB saw an imago feeding from a creeping thistle flowerhead on waste ground by the river-bank at nearby Greenwich Marshes. In Greenwich Park THF recorded an imago at the old reservoir on 22 July 2004 and another at a site between the Flower Garden and the Maze Hill Gate on 23 July 2004.

[*Zygaena trifolii* (Esper) ssp. *palustrella* Verity **L** FIVE-SPOT BURNET
The report in de Worms (1953–58) of the occurrence of this species in Greenwich Park in 1947, ascribed to JFB, refers to a male he captured in the Large Bird Sanctuary on 3 June that year. It was almost certainly the offspring of about twenty bred imagines that, when a schoolboy, he enthusiastically but rather reprehensibly released in the Park in late June 1946, having collected the cocoons on Shooters Hill earlier that

month. *Large numbers* were *not* released as stated by D.F. Owen in Chalmers-Hunt (1960–81). Plant (1993), quoting from Chalmers-Hunt (1960–81), reported the occurrence of ssp. d*ecreta* Verity at Blackheath in 1948, an unlikely habitat for this damp-loving subspecies, which used to occur in a marshy area at Sundridge Park, near Bromley, NW Kent. These imagines were seen by JFB and were ssp. p*alustrella*.]

Zygaena lonicerae (Scheven) ssp. *latomarginata* Tutt NARROW-BORDERED FIVE-SPOT BURNET
The only reports of which we are aware are A.A. Allen's (1970*a*) sightings of two, evidentally strays (probably from Shooters Hill Golf Course, where Burton (1992) found the species to be numerous in the 1940s and 1950s), in his Blackheath garden in about 1954 and on a subsequent visit.

PSYCHIDAE

Luffia ferchaultella (Stephens)
Found by J. Clifton during daytime searching in Greenwich Park on 21 May 2009.

TINEIDAE

Morophaga choragella (Denis & Schiffermüller) **L**
Single imagines captured by THF in Greenwich Park at m.v. light at respectively the Observatory site on 6 July 2004 and at the Bird Sanctuary site on 12 August 2005.

Infurcitinea argentimaculella (Stainton) **L**
Reported in Grinling from Blackheath, but described as scarce.

Nemapogon granella (Linnaeus) CORN MOTH
Reported in Grinling as occurring in most granaries and flour mills in the SE London area.

Nemapogon cloacella (Haworth) CORK MOTH
Described in Grinling as generally abundant. Singles captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 7 June and 6 July 2004.

Nemapogon variatella (Clemens) **pRDB**
A singleton was captured by THF at m.v. light at the Observatory site in Greenwich Park on 17 May 2004. First vice-county record for over sixty years.

Nemapogon ruricolella (Stainton) **Nb**
Reported in Grinling from Greenwich (Tutt) and from Lewisham by Stainton. Two imagoes captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park: one on 7 June 2004, and the other on 23 June 2005.

Nemaxera betulinella (Paykull) **L**
Recorded from Blackheath in Grinling. We are unaware of any later records.

Triaxomasia caprimulgella (Stainton) **pRDB**
Reported from Blackheath in Grinling. On 23 June 2005, THF trapped an imago at m.v. light in Greenwich Park's Bird Sanctuary.

Monopis laevigella (Denis & Schiffermüller) SKIN MOTH
Described in Grinling as generally abundant and specifically reported from Greenwich by Tutt.

Monopis obviella (Denis & Schiffermüller) **L**
Recorded by Tutt from Westcombe Park in Grinling and by THF at m.v. light in Greenwich Park: singles at the Bird Sanctuary site and the Observatory site on 7 June 2004 and 12 August 2005 respectively.

Monopis crocicapitella (Clemens) **L**
The only record of which we are aware is of a single imago caught by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 23 June 2005.

Trichophaga tapetzella (Linnaeus) **Nb** TAPESTRY MOTH
Reported by Tutt from Greenwich in Grinling. We know of no later records.

Tineola bisselliella (Hummel) **L** COMMON CLOTHES MOTH
Reported by Tutt from Greenwich in Grinling, where it was stated that it was very common in the SE London area. We know of no later reports.

Niditinea fuscella (Linnaeus) BROWN-DOTTED CLOTHES MOTH
Described in Grinling as generally common and reported from Greenwich by Tutt. We know of no later records.

Tinea pellionella (Linnaeus) CASE-BEARING CLOTHES MOTH
Reported from Greenwich by Tutt in Grinling, where it was stated to be generally common. No later records.

Tinea flavescentella Haworth **L**
Reported from Greenwich by Tutt in Grinling. We know of no later records.

Tinea pallescentella Stainton LARGE PALE CLOTHES MOTH
Reported from Westcombe Park by Tutt in Grinling. We know of no later records.

Tinea semifulvella Haworth
Reported in Grinling to be generally distributed in the SE London area, the only record we have since then are the singletons captured by THF at m.v. light in Greenwich Park at the Bird Sanctuary site on 7 June and 6 July 2004 and at the Observatory on 4 September 2004.

Tinea trinotella Thunberg
We are unaware of any records prior to THF's capture in 2004 at m.v. light in Greenwich Park of the following: Bird Sanctuary site: 10 on 17 May, two on 7 June, four on 22 July, one on 4 September. At the Observatory site: one on 17 May.

BUCCULATRICIDAE

Bucculatrix albedinella Zeller
THF caught an imago at light at the Observatory site in Greenwich Park on 12 August 2005 and found a larval leaf-mine in the Park on 12 October 2006.

Bucculatrix thoracella (Thunberg) **L**
The only record is the leaf-mine found in Greenwich Park on 12 October 2006 by DJLA and THF.

Bucculatrix ulmella Zeller
THF caught an imago at m.v. light at the Observatory site in Greenwich Park on 12 August 2005. Previously the species was described in Grinling as abundant in the SE London area.

ROESLERSTAMMIIDAE

Roeslerstammia erxlebella (Fabricius)
THF capured imagines at m.v. light in Greenwich Park as follows: two at the Bird Sanctuary site on 7 June 2004 and another on 12 August 2005. No earlier reports from this district.

GRACILLARIIDAE

Caloptilia populetorum (Zeller) **L**
The only record is of one imago captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 11 October 2005.

Caloptilia rufipennella (Hübner) **L**
Captured by THF at m.v. light in Greenwich Park as follows: Bird Sanctuary site: one on 23 June and 12 August 2005; Observatory: three on 22 July 2004 and one each on 23 June and 12 August 2005. DJLA and THF found larval cones in the Park on 12 October 2006.

Caloptilia azaleella (Brants) **L** AZALEA LEAF MINER
Larval cones found by DJLA and THF in Greenwich Park on 12 August 2006. No earlier records.

Caloptilia alchimiella (Scopoli)
Reported in Grinling to be 'generally abundant' in the SE London area, but not specifically reported from Blackheath or Greenwich. Much more recently, THF caught singletons at m.v. light in Greenwich Park at the Bird Sanctuary site on 11 May 2004 and at the Observatory on 12 August 2005. DJLA and THF also found larval cones in the Park on 12 October 2006.

Caloptilia robustella Jäckh
Captured by THF at m.v. light in Greenwich Park as follows: two on 17 May, two on 7 June, one on 22 July and two on 4 September 2004; one on 23 June and three on 12 August 2005. Also larval cones found in the Park on 12 October 2006. No earlier reports.

Caloptilia stigmatella (Fabricius)
Reported in Grinling to be common at Blackheath. On 17 May 2004, THF captured an imago at m.v. light at the Bird Sanctuary site in Greenwich Park.

Caloptilia semifascia (Haworth) **L**
Larval cones found by THF in Greenwich Park on *Acer campestre* in the Bird Sanctuary on 5 July 2008.

Caloptilia syringella (Fabricius)
Described in Grinling as 'generally common' and reported specifically from Westcombe Park by Tutt in 1907. On 17 May 2004, THF captured an imago at light at the Bird Sanctuary site in Greenwich Park.

Parornix betulae (Stainton)
On 4 September 2004, THF caught an imago at m.v. light at the Bird Sanctuary site in Greenwich Park and on 12 October 2006 DJLA and THF found a leaf-mine there. No earlier records.

Parornix anglicella (Stainton)
Reported in 1907 from Westcombe Park by Tutt in Grinling. On 12 October 2006, DJLA and THF found larval spinnings in Greenwich Park.

Callisto denticulella (Thunberg)
The only record is of one imago captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

Phyllonorycter harrisella (Linnaeus)
Described in Grinling as generally abundant in the SE London area, the only recent records are THF's capture of an imago at m.v. light at the Observatory site in Greenwich Park on 12 August 2005 and the discovery of a leaf-mine there by DJLA and THF on 12 October 2006.

Phyllonorycter heegeriella (Zeller)
The only record is of a leaf-mine found by THF in Greenwich Park on 12 October 2006.

Phyllonorycter tenerella (Joannis) **L**
As per the last species.

Phyllonorycter quercifoliella (Zeller)
Described in Grinling as generally abundant in SE London, the only recent record is THF's capture of one at m.v. light at the Observatory site in Greenwich Park on 12 August 2005.

Phyllonorycter platani (Staudinger) **L**
The only record is of leaf-mines found by DJLA and THF in Greenwich Park on 12 October 2006.

Phyllonorycter messaniella (Zeller)
Reported by Tutt in Grinling as common at Westcombe Park, the only recent records are THF's capture at m.v. light in Greenwich Park : one on 17 May, another two on 7 June 2004. In addition, DJLA and THF found leaf-mines in the Park on 12 October 2006.

Phyllonorycter oxyacanthae (Frey)
Reported from Westcombe Park by Tutt in Grinling, the only recent record is the finding of a leaf-mine by DJLA and THF in Greenwich Park on 12 October 2006.

Phyllonorycter sorbi (Frey)
The only record is of an imago captured by THF at m.v. light at the Observatory site in Greenwich Park on 12 August 2005.

Phyllonorycter spinicolella (Zeller)
Reported by Tutt from Westcombe Park in Grinling; no subsequent records.

Phyllonorycter cerasicolella (Herrich-Schäffer) **L**
The only record is of a leaf-mine found in Greenwich Park on 12 October 2006 by DJLA and THF.

Phyllonorycter lantanella (Schrank) **L**
As per the previous species.

Phyllonorycter corylifoliella (Hübner)
As per the previous species.

Phyllonorycter leucographella (Zeller) FIRETHORN LEAF MINER
Leaf-mines of this colonist of Britain since 1989 were first found in Greenwich Park in 1991 by Patrick Roper (1992), who reported that the species was 'now well-established on *Pyracantha* in the grounds of the [National Maritime] Museum.' On 12 April and 12 October 2006, THF found leaf-mines in the Park proper.

Phyllonorycter hilarella (Zetterstedt)
Reported by Tutt from Westcombe Park in Grinling; no subsequent records.

Phyllonorycter maestingella (Müller)
The only record is of leaf-mines found in Greenwich Park on 12 October 2006 by DJLA and THF.

Phyllonorycter esperella Goeze **L**
As per the previous species

Phyllonorycter rajella (Linnaeus)
Reported by Tutt in Grinling from Westcombe Park. On 12 October 2006, DJLA and THF found a leaf-mine of this wetland species by the lake in Greenwich Park.

Phyllonorycter schreberella (Fabricius) **L**
Reported in Grinling to be abundant in the SE London area, including Lewisham. On 12 October 2006, DJLA and THF found a leaf-mine in Greenwich Park.

Phyllonorycter ulmifoliella (Hübner)
The only record is of a leaf-mine found by DJLA and THF in Greenwich Park on 12 October 2006.

Phyllonorycter tristrigella (Haworth)
As per the previous species.

Phyllonorycter platanoidella (Joannis) **L**
As per *P. ulmifoliella*.

Phyllonorycter geniculella (Ragonot)
The only records are of an imago taken by THF at m.v. light on 4 September 2004 at the Bird Sanctuary site in Greenwich Park and a leaf-mine discovered there on 12 October 2006.

Cameraria ohridella Deschka & Dimic HORSE CHESTNUT LEAF MINER
Imagines captured by THF at m.v. light in Greenwich Park on 12 August and on 11 October 2005, and leaf-mines found by him on many dates. Spurr and Hutchinson (2006) reported that the species was inhabiting horse chestnut trees on both sides of the Park's Main Avenue, stating that the leaves turned dry and brown in late summer and that the withered remains were still hanging on in November.

SESIIDAE

Synanthedon tipuliformis (Clerck) **Nb** CURRANT CLEARWING
Tutt in Grinling described this moth as common throughout the SE London area, in gardens, where *Ribes* of any kind are grown, including Westcombe Park, Lewisham, etc. West added Greenwich (1864, 1866, 1867), and Adkin, Lee and Blackheath. Blackheath was also recorded as a haunt of the species in 1926 and A.A. Allen encountered it in his garden there around 1955, but said it was not common (Chalmers-Hunt 1960–81). There do not appear to be any more recent reports.

Synanthedon vespiformis (Linnaeus) **Nb** YELLOW-LEGGED CLEARWING
According to Plant (1993), this extremely local resident in the London Area was recorded at Greenwich before 1900 (presumably West's report of one in Greenwich Park) and at Blackheath in 1972, when an imago was found by A.A. Allen (1975*c*, 2000) at rest on the trunk of a wych elm on 29 July, and where pupae were found at a later date protruding from woody cankers on the bark, and also in two subsequent years. Three more imagines were seen at this site on 11 August 1972. On 24 August 1980, Allen (1975*c*, 2000) observed an imago 'flying about the base of a rather old, but sound sweet chestnut *Castanea sativa* in the "Wilderness" of Greenwich Park'. He went on to remark that: 'Most likely, this moth occurs widely in the locality where, besides rather few oaks *Quercus* spp., sweet chestnuts (some of very great age), are the principal tree.' A current survey has borne out Allen's views: on 23 June 2009, J. Clifton recorded approximately twenty specimens in one hour to VES pheromone lures in the vicinity of ancient sweet chestnuts in the south eastern area of the Park.

Synanthedon myopaeformis (Borkhausen) **Nb** RED-BELTED CLEARWING

According to Chalmers-Hunt (1960–81), the first record of this species in Kent was from Blackheath in 1831. In Grinling, Tutt described it as generally distributed and common in apple and pear trees in gardens, mentioning Greenwich as a locality, while Fenn mentioned that it was not rare at Blackheath, where A.A. Allen (Chalmers-Hunt 1960–81) obtained an imago from a bush under an apple tree in his garden on 20 April 1959.

GLYPHIPTERIGIDAE

Glyphipterix equitella (Scopoli) **Notable**

Reported by Tutt in Grinling from gardens at Greenwich and Westcombe Park. No later records.

Glyphipterix fuscoviridella (Haworth)

Stated by B.A. Bower in Grinling to be 'generally abundant' in the SE London area from where it was also reported by Tutt from Greenwich at that time (e.g. around 1900). No later records.

Glyphipterix thrasonella (Scopoli)

Stated by B.A. Bower in Grinling to 'generally common' in the SE London area. No later records.

YPONOMEUTIDAE

Argyresthia trifasciata Staudinger **L**

This moth, which has colonized England from the European mainland since 1982, has been captured by THF at m.v. light in Greenwich Park in 2004 as follows: five on 17 May and singles on 7 June and 4 September.

Argyresthia brockeella (Hübner)

In Grinling described as 'generally abundant' in the SE London area. One imago captured by THF at the Bird Sanctuary site in Greenwich Park on 7 June 2004.

Argyresthia goedartella (Linnaeus)

Described in Grinling as 'generally abundant' in the SE London area. One imago captured by THF at m.v. light at the Observatory site in Greenwich Park on 12 August 2005.

Argyresthia curvella (Linnaeus)

Reported by Tutt in Grinling to be common at Westcombe Park. No later records.

Argyresthia spinosella Stainton

Reported as uncommon in Westcombe Park by Tutt in Grinling. Single imagines captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 7 June 2004 and 23 June 2005.

Argyresthia conjugella Zeller APPLE FRUIT MOTH

Reported by B.A. Bower in Grinling to be common in the SE London area, but not specifically reported from our area. Recently, THF captured imagines at m.v. light in Greenwich Park as follows: four at the Bird Sanctuary site on 7 June 2004.

Argyresthia bonnetella (Linnaeus)

Described in Grinling as abundant in SE London and reported by Tutt from Westcombe Park. On 12 August 2005, THF captured an imago at m.v. light at the Bird Sanctuary site in Greenwich Park.

Yponomeuta padella (Linnaeus) ORCHARD ERMINE

Described in Grinling as 'generally abundant' in SE London and reported by Tutt from Westcombe Park. On 7 July 1952, K.H. Hyatt captured four specimens at Blackheath where he recalls that it was quite common. On 6 July 2004, THF captured an imago at m.v. light at the Bird Sanctuary site in Greenwich Park.

Yponomeuta cagnagella (Hübner) SPINDLE ERMINE

In 2004 THF captured at m.v. light single imagines at the Bird Sanctuary site in Greenwich Park on 6 July and at the Observatory on 22 July. No earlier reports from this area.

Yponomeuta plumbella (Denis & Schiffermüller)

Reported from Blackheath in Grinling. No later records.

Zelleria hepariella (Stainton) **L**

On 12 August 2005, THF caught an imago at m.v. light at the Bird Sanctuary site in Greenwich Park.

Swammerdamia pyrella (Villers)
Reported in Grinling to be 'generally common' in the SE London area and stated by Tutt to occur at Westcombe Park. In Greenwich Park THF captured at m.v. light an imago on 17 May 2004 and six on 22 July 2004.

Cedestis gysseleniella (Zeller)
Reported from Blackheath by Allen (1965) but stated by him to be rare there.

Prays fraxinella (Bjerkander) ASH BUD MOTH
Reported by Tutt from Westcombe Park in Grinling and in recent years from Greenwich Park by THF as follows: single imagines on 7 June, 6 July and 22 July 2004; three on 23 June 2005.

Scythropia crataegella (Linnaeus)
HAWTHORN MOTH
Reported in Grinling to be 'scarce' in the SE London area. THF captured the following imagines at m.v. light in Greenwich Park: singles on 7 June and 4 September 2004; four on 12 August 2005.

Ypsolopha sylvella (Linnaeus) **L**
On 22 July 2004, THF captured an imago at m.v. light at the Bird Sanctuary site in Greenwich Park. No other records.

Ypsolopha ustella (Clerck)
On 7 June 2004, THF captured an imago at m.v. light at the Bird Sanctuary site in Greenwich Park. No other records.

Ypsolopha vittella (Linnaeus)
Reported by Tutt in Grinling from Westcombe Park. No other records.

Plutella xylostella (Linnaeus) DIAMOND-BACK MOTH
Stated in Grinling to be 'generally abundant' in south-east London from where it was reported at Westcombe Park by Tutt. In recent years THF caught the following imagines in Greenwich Park: eight on 22 July 2004, plus one at on 23 June 2005.

Acrolepia autumnitella Curtis **L**
Stated in Grinling to be abundant in the SE London area and reported from Lewisham by Stainton. No later reports.

LYONETIIDAE

Leucoptera laburnella (Stainton) LABURNUM LEAF MINER
Described as abundant and reported from Blackheath in Grinling. No later reports.

Leucoptera malifoliella (Costa)
PEAR LEAF BLISTER MOTH
Described as abundant and reported from Westcombe Park (Tutt) in Grinling. No later reports.

Lyonetia clerkella (Linnaeus) APPLE LEAF MINER
Taken at m.v. light in Greenwich Park on 23 June 2005 by THF; leaf-mine also found by him on 12 October 2006. No earlier reports.

COLEOPHORIDAE

Coleophora lutipennella (Zeller)
Reported from Westcombe Park in Grinling and by THF from Greenwich Park: one at m.v. light at the Bird Sanctuary site on 6 July 2004 and another on 4 July 2008.

Coleophora serratella (Linnaeus)
Described by Tutt in Grinling as abundant everywhere in the SE London area. No later records.

Coleophora coracipennella (Hübner)
Described in Grinling as 'common generally' in the SE London area. No later records.

Coleophora spinella (Schrank) APPLE AND PLUM CASE-BEARER
The only record is of a larval case found by DJLA and THF in Greenwich Park on 12 October 2006.

Coleophora siccifolia Stainton **L**
Reported from Westcombe Park by Tutt in Grinling. No other records.

Coleophora lusciniaepennella (Treitschke)
As per the previous species.

Coleophora frischella (Linnaeus) SMALL CLOVER CASE-BEARER
As per *C. siccifolia.*

Coleophora mayrella (Hübner)
As per *C. siccifolia.*

Coleophora lineolea (Haworth)
As per *C. siccifolia.*

Coleophora hemerobiella (Scopoli) **Nb**
Recorded from nearby Charlton in Grinling, otherwise the only record in our area is the imago caught by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 22 July 2004.

Coleophora laricella (Hübner) LARCH CASE-BEARER
Stated in Grinling to occur everywhere on larch in the SE London area. No later records.

Coleophora betulella Heinemann
Reported from Westcombe Park and Lewisham in Grinling, and from Greenwich Park by THF: single imagines taken at m.v. light at the Bird Sanctuary and Observatory sites on 23 June 2005.

Coleophora albicosta (Haworth)
Reported from Westcombe Park by Tutt in Grinling, and from Greenwich Park by THF: two caught at the Observatory site on 17 May 2004.

Coleophora paripennella Zeller
Reported in Grinling from Westcombe Park (Tutt) and Lewisham (Stainton). No later records.

Coleophora otidipennella (Hübner) (*murinpennella*)
Reported from Westcombe Park by Tutt in Grinling. No other records.

Coleophora alticolella Zeller
The only records are of single imagines caught by THF at m.v. light in the Bird Sanctuary, Greenwich Park in 2004: one on 7 June and the other on 22 July.

ELACHISTIDAE

Elachista rufocinerea (Haworth)
Described in Grinling as 'generally abundant' in the SE London area, our only recent record is of the imago caught by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 11 May 2004.

Elachista argentella (Clerck)
Reported by Tutt from Blackheath and Westcombe Park in Grinling. The only recent record is of the one taken by THF at m.v. light in Greenwich Park's Bird Sanctuary on 17 May 2004.

OECOPHORIDAE

Crassa tinctella (Hübner) **L**
Reported from Westcombe Park by Tutt in Grinling. No other records.

Batia lunaris (Haworth) **L**
Reported from nearby Lewisham by Stainton in Grinling and recently by THF from the Bird Sanctuary site in Greenwich Park: one at m.v. light on 23 June 2005.

Batia unitella (Hübner) **L**
Reported from Blackheath as 'not common' by B.A. Bower in Grinling. In recent years, THF captured the following at m.v. light in Greenwich Park: singles on 6 and 22 July 2004, and six on on 23 June 2005.

Borkhausenia fuscescens (Haworth)
One imago obtained by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

Hofmannophila pseudospretella (Stainton) BROWN HOUSE-MOTH
Described by Tutt in Grinling as 'common everywhere' in the SE London area, THF obtained several at m.v. light in Greenwich Park on the following dates: 17 May and 4 September 2004; 23 June and 12 August 2005.

Endrosis sarcitrella (Linnaeus) WHITE-SHOULDERED HOUSE-MOTH
Reported by B.A. Bower in Grinling to be 'too generally common' in the SE London area. Much more recently, THF obtained the following at m.v. light in Greenwich Park: six on 17 May, one on 7 June, and another on 22 July 2004; two on 12 August 2005.

Esperia sulphurella (Fabricius)
Reported by B.A. Bower in Grinling to be 'generally abundant' in the SE London area. No other reports.

Esperia oliviella (Fabricius) **Notable**
Reported in Grinling from Blackheath by B.A. Bower and from Westcombe Park by Tutt. No later records.

Alabonia geoffrella (Linnaeus) **L**
Reported by Bower in Grinling to be 'generally common' in the SE London area. No later records.

Tachystola acroxantha (Meyrick) **pRDB3**
THF obtained two imagines at m.v. light at the Bird Sanctuary site in Greenwich Park on 12 August 2005, these being the first records for the vice-county (V.C. 16). He took a further specimen on 4 July 2008 at the same site.

Carcina quercana (Fabricius)
Described in Grinling as generally common in SE London and specifically mentioned by Tutt as occurring at Westcombe Park. Captured by THF at m.v. light in Greenwich Park as follows: one on 6 July, four on 22 July, and three on 4 September 2004, four on 23 June, and four on 12 August 2005.

Pseudatemelia josephinae (Toll) **L**
One imago obtained by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 23 June 2005. No other reports.

Diurnea fagella (Denis & Schiffermüller)
Reported in Grinling to be 'common generally, many dark examples occur' in SE London. K.H. Hyatt collected four specimens in Greenwich Park on 18 April 1953. On 12 April 2006, THF obtained two imagines at m.v light in Greenwich Park's Bird Sanctuary.

Diurnea lipsiella (*phryganella*) (Denis & Schiffermüller) **L**
Described in Grinling as being 'generally distributed' throughout the SE London area. No later records.

Agonopterix heracliana (Linnaeus)
Described by B.A. Bower in Grinling as 'generally abundant' in SE London. Taken by THF at m.v. light in Greenwich Park: one at the Bird Sanctuary site on 22 July 2004 and another at the Observatory site on 12 April 2006.

Agonopterix nervosa (Haworth)
Described by B.A. Bower in Grinling as 'generally abundant' and reported by Tutt from Blackheath. At Lewisham, Adkin stated that it was very common in 1885, but subsequently was only found 'sparingly'. No other reports.

Agonopterix conterminella (Zeller) **L**
Described by Bower in Grinling as 'generally abundant' in the SE London area. No other reports.

GELECHIIDAE

Chrysoesthia drurella (Fabricius)
Described in Grinling as common in the SE London area and specifically recorded from Greenwich and Lewisham by B.A. Bower. No later records.

Bryotropha affinis (Haworth)
Reported by Stainton in Grinling from Lewisham and by Bower from nearby Charlton. In recent years THF caught imagines at m.v. light in Greenwich Park's Bird Sanctuary as follows: singles on 22 July and 4 September 2004, and also on 23 June and 12 August 2005.

Bryotropha similis (Stainton)
Reported by Tutt in Grinling from Westcombe Park. On 12 August 2005, THF caught one at m.v. light in Greenwich Park's Bird Sanctuary.

Bryotropha terrella (Denis & Schiffermüller)
Described by Bower in Grinling as abundant in the SE London area and reported there from Westcombe Park by Tutt. No later reports.

Bryotropha domestica (Haworth)
Reported by Tutt in Grinling from Westcombe Park. On 12 August 2005, THF caught one at m.v. light in Greenwich Park's Bird Sanctuary.

Stenolechia gemmella (Linnaeus) **L**
Reported by Tutt in Grinling from Westcombe Park and in recent years by THF from Greenwich Park where he caught an imago at m.v. light at the Observatory site on 12 August 2005.

Parachronistis albiceps (Zeller)
Described in Grinling as 'uncommon' and reported by Tutt from Westcombe Park. No later records.

Recurvaria nanella (Denis & Schiffermüller) **Nb**
Reported in Grinling by Bower from Blackheath and nearby Charlton, and by Tutt from Westcombe Park. No later records.

Recurvaria leucatella (Clerck) **Nb**
Reported in Grinling by Bower from Blackheath, Stainton from Lewisham and Tutt from Westcombe Park. No later records.

Coleotechnites piceaella (Kearfott) **pRDB2**
This moth has been colonizing Norway spruce since it arrived in England in 1952. Allen (1965) recorded a single imago at Blackheath.

Exoteleia dodecella (Linnaeus)
Reported by Allen (1965) to occur at Blackheath but 'not common.' Our only other record is of an imago taken by THF at m.v. light on 6 July 2004 in Greenwich Park's Bird Sanctuary.

Teleiodes vulgella (Denis & Schiffermüller)
Reported in Grinling as 'generally common' in the SE London area and specifically recorded from Westcombe Park by Tutt. Our only recent record is of an imago taken by THF at m.v. light on 23 June 2005 in Greenwich Park's Bird Sanctuary.

Teleiodes luculella (Hübner) **L**
Described by Bower in Grinling as 'generally common, in recent years' in SE London. THF has caught imagines at m.v. light in Greenwich Park as follows: one on 7 June and another on 22 July 2004; eleven on 23 June 2005.

Carpatolechia proximella (Hübner)
Reported by Bower in Grinling to be generally abundant in the S.E: London area. No later records.

Carpatolechia fugitivella (Zeller)
Described by Bower in Grinling as 'abundant throughout' SE London. No later reports.

Teleiopsis diffinis (Haworth)
Reported by Tutt in Grinling from Westcombe Park. No later records.

Mirificarma mulinella (Zeller)
Reported by Tutt in Grinling from Blackheath. No later reports.

Aroga velocella (Zeller) **L**
Reported by Tutt in Grinling from Westcombe Park. On 17 May 2004, THF caught one at m.v. light in Greenwich Park's Bird sanctuary.

Gelechia senticetella (Staudinger) **L**
THF caught imagines at m.v light in Greenwich Park as follows: singles on 22 July 2004; 23 June and 12 August 2005; 4 July 2008.

Scrobipalpa atriplicella (Fischer von Röslerstamm)
Described by B.A. Bower in Grinling as 'generally common' in the SE London area. No precise records.

Caryoclorum tricolorella (Haworth)
As per the previous species.

Anacampsis populella (Clerck)
Described by Bower in Grinling as 'generally abundant' in the SE London area. No precise records.

Anarsia spartiella (Schrank) **L**
Reported from Blackheath by H.T. Turner in Grinling. No other records.

Dichomeris marginella (Fabricius) JUNIPER WEBBER
Reported from Blackheath by Allen (1965) though stated by him to be rare there. The only other record is of the imago captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 12 August 2005.

Brachmia blandella (Fabricius)
Reported by Tutt in Grinling from nearby Charlton. The only recent record is of the imago captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 6 July 2004.

Helcystogramma rufescens (Haworth)
Described by Bower in Grinling as 'generally abundant' in the SE London area. The only precise recent record is of the imago captured by THF at m.v. light at the Observatory site in Greenwich Park on 22 July 2004.

Platyedra subcinerea (Haworth) **Na**
The only records are of singles captured by THF at m.v. light on 17 May 2004 in Greenwich Park at the Bird Sanctuary and Observatory sites.

Pexicopia malvella (Hübner) **Nb** HOLLYHOCK SEED MOTH
An imago was captured at m.v. light by THF at the Observatory site in Greenwich Park on 6 July 2004; he took a further specimen at the Bird Sanctuary site on 4 July 2008.

AUTOSTICHIDAE

Oegoconia caradjai Popescu-Gorj & Cap **Nb**
Two imagines captured by THF at m.v. light on 23 June 2006 at the Bird Sanctuary site in Greenwich Park is the only record.

BLASTOBASIDAE

Blastobasis adustella Walsingham (was *lignea*) **L**
The following were captured by THF at m.v. light in Greenwich Park: nineteen on 22 July and one on 4 September 2004, nine on 12 August 2005. No earlier records.

Blastobasis lacticolella Rebel (was *decolorella*) **L**
THF captured the following at m.v. light in Greenwich Park: one on 6 July and three on 4 September 2004; one on 23 June 2005. No earlier records.

BATRACHEDRIDAE

Batrachedra praeangusta (Haworth)
Described by Bower in Grinling as 'generally abundant' in the SE London area and specifically recorded there from Westcombe Park by Tutt. No later records.

Batrachedra pincolella (Zeller) **Nb**
Reported in Grinling from Blackheath by Bower. No later records.

MOMPHIDAE

Mompha sturnipennella (Treitschke) (*nodicolella*) **Nb**
Allen (1975*b*) reported his capture of this very local species at m.v. light at Blackheath on 2 July 1960.

Mompha subbistrigella (Haworth)
The only record is of an imago captured by THF at m.v. light in Greenwich Park's Bird Sanctuary on 7 June 2004.

Mompha epilobiella (Denis & Schiffermüller)
Described by Bower in Grinling as 'generally abundant' in the SE London area and specifically recorded there from Westcombe Park by Tutt. No later reports.

COSMOPTERIGIDAE

Chrysoclista linneella (Clerck) **Na**
Reported in Grinling from Blackheath (Bower) and Greenwich (Tutt). No later reports.

Spuleria flavicaput (Haworth)
Described in Grinling as abundant in the SE London area and specifically recorded by Tutt from Westcombe Park. No later reports.

Blastodacna hellerella (Duponchel)
Described by Bower in Grinling as common in the SE London area. In 2005 THF captured at m.v. light in Greenwich Park on 23 June four imagines at the Bird Sanctuary site and five at the Observatory.

Blastodacna atra (Haworth) **Nb** APPLE PITH MOTH
Reported from Westcombe Park by Tutt in Grinling and, much more recently, one was captured by THF at m.v. light in Greenwich Park's Bird Sanctuary on 23 June 2005.

Dystebenna stephensi (Stainton) **pRDB3**
The only record we have is of the imago captured by THF at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004.

SCYTHRIDIDAE

Scythris limbella (Fabricius) **pRDB3**
The only record is of the imago captured by THF at m.v. light at the Observatory site in Greenwich Park on 23 June 2005.

TORTRICIDAE

Cochylimorpha straminea (Haworth)
The only record is of the two captured by THF at m.v. light in Greenwich Park on 12 August 2005: one at the Bird Sanctuary site and one at the Observatory.

Agapeta hamana (Linnaeus)
Reported by Tutt in Grinling from Blackheath and Westcombe Park. Much more recently, THF trapped singletons at m.v. light on the following dates in Greenwich Park's Bird Sanctuary: 7 June 2004 and 23 June 2005.

Aethes rubigana (Treitschke) **L**
Reported in Grinling by Tutt from Greenwich. No later records.

Aethes smeathmanniana (Fabricius) **L**
Reported by Tutt in Grinling from Greenwich and Westcombe Park. No later records.

Cochylidia implicitana (Wocke) **L**
Reported by Tutt in Grinling fom Westcombe Park. No later records.

Cochylidia rupicola (Curtis) **L**
Reported by Tutt in Grinling from Westcombe Park. No later records.

Cochylis nana (Haworth)
Reported by West in Grinling from Blackheath Park. No later records.

Pandemis corylana (Fabricius) CHEQUERED FRUIT-TREE TORTRIX
Reported by West in Grinling from Blackheath. In recent years, THF caught the following at m.v. light in Greenwich Park: four on 4 September 2004, and 15 on 12 August 2005.

Pandemis cerasana (Hübner) BARRED FRUIT-TREE TORTRIX
Described by Fenn in Grinling as 'generally abundant' in the SE London area. In recent years, THF caught the following at m.v. light in Greenwich Park: four on 7 June 2004, and three on 23 June 2005.

Pandemis heparana (Denis & Schiffermüller) DARK FRUIT-TREE TORTRIX
Reported in Grinling to be 'generally common'. At Blackheath, K.H. Hyatt caught one in his house on 15 August 1958. In Greenwich Park, THF caught two singles at m.v. light: one at the Bird Sanctuary site on 22 July 2004 and one at the Observatory on 12 August 2005.

Archips podana (Scopoli) LARGE FRUIT-TREE TORTRIX
Described by J. A. Butterfield in Grinling as 'common throughout' the SE London area. In Greenwich Park, THF caught the following at m.v. light: three on 7 June 2004, and seven on 23 June 2005.

Archips crataegana (Hübner) **L** BROWN OAK TORTRIX
THF captured two at m.v. light in Greenwich Park as follows: one on 7 June 2004, and another on 23 June 2005. no earlier reports.

Archips xylosteana (Linnaeus) VARIEGATED GOLDEN TORTRIX
Reported by J. A. Butterfield in Grinling as 'common in July' in the SE London area. On 23 June 2005, THF caught singles at at m.v. light in both the Bird Sanctuary and Observatory sites in Greenwich Park.

Choristoneura hebenstreitella (Müller) **L**
Described by J. A. Butterfield in Grinling as 'generally to be found where oak occurs' in the SE London area. On 7 June 2004, THF caught an imago at m.v. light at the Bird Sanctuary site in Greenwich Park.

Ptycholomoides aeriferanus (Herrich-Schäffer) **L**
This species has colonized England since first arriving in Kent in 1951. On 1 July 1969 an imago was captured by A. A. Allen (1970*b*) in his garden m.v. light trap in Blackheath Park. The larva feeds on European larch.

Clepsis consimilana (Hübner)
Caught at m.v. light by THF in Greenwich Park on 23 June 2005 as follows: four in the Bird Sanctuary and two at the Observatory site. No earlier reports.

Epiphyas postvittana (Walker) LIGHT BROWN APPLE MOTH
Caught at m.v. light by THF in Greenwich Park as follows: one on 11 May, nine on 17 May, nine on 7 June, one on 6 July, one on 22 July, and eight on 4 September 2004; one on 23 June, three on 12 August, and three on 11 October 2005. No earlier records.

Ptycholoma lecheana (Linnaeus) **L**
On 7 June 2004, THF caught two at m.v. light in Greenwich Park, one at the Bird Sanctuary and one at the Observatory sites. No earlier records.

Lozotaeniodes formosanus (Geyer) **L**
This species, whose larvae feed on Scots pine has colonized England since about 1945, when it was first reported from Surrey. A.A. Allen (1969*a*) trapped one at m.v. light in his garden at Blackheath on 13 July 1968. On 22 July 2004, THF caught an imago at m.v. light in Greenwich Park's Bird Sanctuary.

Lozotaenia forsterana (Fabricius) **L**
Reported in Grinling from Westcombe Park by Tutt. No later records.

Epagoge grotiana (Fabricius) **L**
Reported in Grinling from Blackheath by West and from Westcombe Park by Tutt. No later records.

Ditula angustiorana (Haworth) RED-BARRED TORTRIX
Described in Grinling by J. A. Butterfield as 'abundant generally' in the SE London area. In recent years THF caught the following at m.v. light in Greenwich Park: in 2004: five on 6 July; in 2005: five on 23 June and one on 12 August.

Pseudargyrotoza conwagna (Fabricius)
Reported by J. A. Butterfield in Grinling to be 'common among privet, etc.', in the SE London area. Recently, THF caught the following at m.v. light in Greenwich Park: five on 7 June 2004 and 14 on 23 June 2005.

Cnephasia stephensiana (Doubleday) GREY TORTRIX
In 2004, THF trapped the following at m.v. light in Greenwich Park: two on 6 July and four on 22 July. No earlier records.

Cnephasia asseclana (Denis & Schiffermüller) FLAX TORTRIX
The only record is of the imago captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

Cnephasia incertana (Treitschke) **L** LIGHT GREY TORTRIX
In Grinling reported by Tutt from Westcombe Park and described by Butterfield as 'generally abundant' in the area. In Greenwich Park, THF caught single moths at m.v. light at the Bird Sanctuary site on 7 June 2004, and 23 June 2005.

Tortricodes alternella (Denis & Schiffermüller)
Reported by West in Grinling from Blackheath and Greenwich Park. No other records.

Eana osseana (Scopoli) **L**
On 22 July 2004, THF trapped a single imago at m.v. light in Greenwich Park's Bird Sanctuary. No earlier records.

Eana incanana (Stephens)
In Greenwich Park THF caught the following at m.v. light: three on 6 July 2004, five on 23 June 2005, and 13 on 4 July 2008.

Aleimma loeflingiana (Linnaeus)
J. A. Butterfield stated in Grinling that this species occurs 'in abundance in the SE London area wherever oak is found'. In Greenwich Park THF caught the following imagines at m.v. light: two on 7 June 2004 and ten on 23 June 2005.

Tortrix viridana (Linnaeus) GREEN OAK TORTRIX
Stated by J. A. Butterfield in Grinling to be 'only too abundant' in the SE London area, it was still so in the 1940s and 1950s. As mentioned in Burton and Hyatt (1953) and Burton (2001), several hundred adult and juvenile starlings used to join house sparrows and chaffinches in searching the foliage of oaks, limes and other trees in May and early June for the abundant larvae of this and other defoliating species in Greenwich Park. More recently, THF trapped at m.v. light the following numbers of imagines in the Park: Bird Sanctuary: 120 on 7 June 2004 and 100 on 23 June 2005; Observatory site: 15 on 23 June 2005.

Acleris bergmanniana (Linnaeus)
Stated by Fenn in Grinling to be 'very common on wild rose' in the SE London area. No specific reports from Blackheath or Greenwich.

Acleris forsskaleana (Linnaeus)
Reported by J. A. Butterfield in Grinling to be 'common wherever maple is found' in the SE London area and by Adkin from Lewisham. In recent years THF trapped the following at m.v. light in Greenwich Park: two on 6 July and five on 22 July 2004; five on 23 June 2005.

Acleris sparsana (Denis & Schiffermüller)
In Grinling reported from Blackheath by West and Westcombe Park by Tutt. K. H. Hyatt collected a specimen in Greenwich Park on 12 October 1952. The only recent record is of the imago trapped by THF at m.v. light on 11 October 2005 at the Observatory site in Greenwich Park.

Acleris rhombana (Denis & Schiffermüller) RHOMBOID TORTRIX
In Grinling stated by J. A. Butterfield to be 'abundant and very variable wherever hawthorn occurs' in the SE London area. No later reports.

Acleris ferrugana (Denis & Schiffermüller)
Reported in Grinling to be common in the SE London area, including Lewisham (H.J. Turner). On 6 July 2004, THF caught two moths at m.v. light in Greenwich Park's Bird Sanctuary, and a further four there on 4 July 2008.

Acleris notana (Donovan)
In Greenwich Park, THF trapped single moths at m.v. light at both the Bird Sanctuary and Observatory sites on 6 July 2004 and two at the first-named site on 12 April 2006.

Acleris schalleriana (Linnaeus) **L**
One imago recorded by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

Acleris variegana (Denis & Schiffermüller) GARDEN ROSE TORTRIX
Stated by Butterfield in Grinling to be 'abundant generally among whitethorn' in the SE London area. In Greenwich Park THF caught the following at m.v. light: Bird Sanctuary: four on 4 September 2004 and one on 12 August 2005.

Acleris literana (Linnaeus) **L**
Reported by West on fences at Blackheath in Grinling and at m.v. light in Greenwich Park's Bird Sanctuary by THF, a single imago on 17 May 2004.

Celypha striana (Denis & Schiffermüller) **L**
Reported by Tutt in Grinling from Westcombe Park and, much more recently, by THF from Greenwich Park's Bird Sanctuary: one at m.v. light on 23 June 2005, and a further four on 4 July 2008.

Celypha lacunana (Denis & Schiffermüller)
In Grinling, stated by J. A. Butterfield to be 'abundant everywhere' in the SE London area. On 7 June 2004, THF trapped two at m.v. light in Greenwich Park's Bird Sanctuary, and a further two on 4 July 2008.

Piniphila bifasciana (Haworth) **L**
Recorded from Blackheath by Allen (1965) but stated by him to be 'not common.'

Hedya nubiferana (Haworth) MARBLED ORCHARD TORTRIX
The only record is THF's capture of one at m.v. light in Greenwich Park's Bird Sanctuary on 23 June 2005.

Hedya ochroleucana (Frölich)
In Grinling stated by Butterfield 'to be found more ore less sparingly wherever wild rose occurs' in SE London and reported by Adkin from Lewisham. No later reports.

Orthotaenia undulana (Denis & Schiffermüller)
Reported by Butterfield in Grinling to be 'common and generally distributed' throughout the SE London area. No further reports.

Apotomis betuletana (Haworth)
In Grinling reported by Fenn to occur on palings at Blackheath. No later reports.

Endothenia pullana (Haworth) **pRDB3**
Reported in Grinling from Blackheath by West. No later records.

Eudemis profundana (Denis & Schiffermüller) **L**
Reported by West in Grinling from Blackheath. Much more recently, in Greenwich Park, THF trapped the following at m.v. light: in 2004, one on 6 July, 12 on 22 July, and two on 4 September; in 2005, two on 12 August.

Epinotia bilunana (Haworth)
Reported in Grinling from Blackheath and Westcombe Park by Tutt. No later reports.

Epinotia ramella (Linnaeus)
Reported in Grinling from Westcombe Park by Tutt. No later reports.

Epinotia immundana (Fischer von Röslerstamm) **L**
Reported in Grinling from Lewisham and, much more recently, from Greenwich Park, where THF trapped single moths at the Observatory site on 7 June and 22 July 2004.

Epinotia nisella (Clerck) **L**
Reported in Grinling from Blackheath by West (*E. nisella* f. *cinereana)* and, much more recently, from Greenwich Park, where THF trapped a moth at m.v. light at the Bird Sanctuary site on 22 July 2004.

Epinotia tenerana (Denis & Schiffermüller) NUT BUD MOTH
Reported in Grinling from Blackheath by West.

Epinotia tedella (Clerk)
An imago reported from Blackheath by Allen (1965).

Epinotia nanana (Treitschke) **L**
Reported in Grinling from Westcombe Park by Tutt. No later reports.

Epinotia abbreviana (Fabricius) **L**
Reported in Grinling by J. A. Butterfield to be 'very common amongst elm' in the SE London area. More recently, THF trapped the following at m.v. light in Greenwich Park's Bird Sanctuary: two on 7 June and one on 6 July 2004, plus seven on 23 June 2005.

Rhopobota naevana (Hübner) HOLLY TORTRIX
Reported in Grinling from Blackheath by Fenn and from Westcombe Park by Tutt. On 22 July 2004, THF trapped one at m.v. light in Greenwich Park's Bird Sanctuary.

Zeiraphera ratzeburgiana (Ratzeburgh) **L** SPRUCE BUD MOTH
Reported in Grinling from Westcombe Park by Tutt. No other records.

Zeiraphera isertana (Fabricius)
Reported in Grinling from Blackheath by West and from Westcombe Park by Tutt. Recently, THF trapped the following in Greenwich Park: in 2004, three on 6 June and five on 22 July; in 2005, four on 23 June; in 2008, over 50 on 4 July.

Zeiraphera griseana (Hübner) LARCH TORTRIX
Reported by Allen (1965) to be 'fairly common' at Blackheath.

Gypsonoma aceriana (Duponchel) **L**
Reported in Grinling from Blackheath by West and from Westcombe Park by Tutt. No other records.

Gypsonoma sociana (Haworth) **L**
Stated by Butterfield in Grinling to be 'generally distributed' in the SE London area. On 7 June 2004, THF caught an imago at m.v. light in Greenwich Park's Bird Sanctuary.

Gypsonoma dealbana (Frölich)
Reported in Grinling from Blackheath by West and from Westcombe Park by Tutt. In Greenwich Park, THF trapped one moth on 22 July 2004, and a further eight on 23 June 2005.

Gypsonoma minutana (Hübner) **Nb**
Reported in Grinling from Blackheath and Westcombe Park by Tutt. No other records.

Epiblema cynosbatella (Linnaeus)
Reported in Grinling from Westcombe Park by Tutt. On 17 May 2004, THF caught three at m.v. light in Greenwich Park's Bird Sanctuary.

Epiblema uddmanniana (Linnaeus) BRAMBLE SHOOT-MOTH
Described in Grinling by Fenn as 'generally distributed' and by J. A. Butterfield as 'larvae very common everywhere in twisted bramble leaves'. The only recent record is of the imago trapped by THF at m.v. light at the Observatory site in Greenwich Park on 23 June 2005.

Epiblema trimaculana (Haworth) **L**
Described in Grinling by Butterfield as 'common in hedgerows' in the SE London area. No other records.

Epiblema rosaecolana (Doubleday)
Described in Grinling by Fenn as 'often abundant' in the SE London area and reported from Westcombe Park by Tutt. No later records.

Epiblema roborana (Denis & Schiffermüller)
Described in Grinling by Butterfield as 'only too abundant on roses' in the SE London area. No precise reports.

Epiblema foenella (Linnaeus) **L**
K. H. Hyatt collected a specimen at Blackheath on 15 August 1958. Since then, one trapped by THF at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004 is the only other record of which we are aware.

Eucosma pupillana (Clerck) **Nb**
On 21 July 1967, A. A. Allen (1969*a*) caught a fresh imago of this moth, a species usually associated with coasts. However, its larval foodplant wormwood is plentiful on waste ground in the vicinity of the Thames in our area (Burton 1983).

Eucosma hohenwartiana (Denis & Schiffermüller)
THF trapped three at m.v. light at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

Eucosma cana (Haworth)
Described in Grinling by Fenn as 'not scarce' in the SE London area. On 22 July 2004, THF trapped an imago at m.v. light at the Observatory site in Greenwich Park.

Spilonota ocellana (Denis & Schiffermüller) BUD MOTH
Stated by Butterfield in Grinling as abundant, with melanic forms of frequent occurrence, and reported from Blackheath by West. THF trapped single imagines at m.v. light at the Observatory site in Greenwich Park on 22 July 2004, and 23 June 2005.

Spilonota laricana (Heinemann)
Reported in Grinling from Blackheath by West. No other reports.

Clavigesta purdeyi (Durrant) **L** PINE LEAF-MINING MOTH
Reported from Blackheath by Allen (1965), but stated by him to be 'not common.'

Rhyacionia buoliana (Denis & Schiffermüller) **L** PINE SHOOT MOTH
Reported in Grinling from Blackheath by West and from Greenwich Park by Tutt and, more recently, from Blackheath (one imago) by Allen (1965).

Rhyacionia pinicolana (Doubleday) **L**
Reported in Grinling from Westcombe Park by Tutt and, more recently, from Blackheath (one imago) by Allen (1965).

Rhyacionia pinivorana (Lienig & Zeller) SPOTTED SHOOT MOTH
Allen (1965) caught two imagines at m.v. light at Blackheath and, much more recently, THF trapped an imago at m.v. light in Greenwich Park's Bird Sanctuary on 7 June 2004.

Pammene argyrana (Hübner) **L**
Stated by Butterfield in Grinling to be abundant in the S.E London area and reported from Greenwich Park by W. West. No later records.

Pammene spiniana (Duponchel) **L**
Reported in Grinling from Blackheath by West. No other records.

Pammene aurita (Razowski) **L**
The only records are an imago at rest on a willow at Blackheath Park in 1970 (Allen 1970*b*), and of one taken by THF at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004.

Pammene regiana (Zeller)
Reported in Grinling from Greenwich Park and Westcombe Park by Tutt. Allen (1970*b*) stated that it breeds 'freely' on mature sycamores at Blackheath Park.

Pammene fasciana (Linnaeus)
THF trapped the following imagines in Greenwich Park: Bird Sanctuary: singles on 7 June, 6 and 22 July 2004, 23 June and 12 August 2005, Observatory site: singles on 7 June 2004 and 12 August 2005. No earlier records.

Pammene rhediella (Clerck) FRUITLET MINING TORTRIX
Reported in Grinling from Greenwich by Tutt. No other reports.

Pammene aurana (Fabricius)
Imagines seen annually, but 'very sparsely', by A. A. Allen (1970*b*) at Blackheath Park; seen flying around hogweed, the larval foodplant.

Grapholita internana (Guenée) **L**
Reported in Grinling from gorse at Blackheath by West.

Grapholita janthinana (Duponchel) **L**
Reported in Grinling frrom Blackheath by West and from Westcombe Park by Tutt. The only recent record is the imago trapped by THF at m.v. light in Greenwich Park's Bird Sanctuary on 23 June 2005.

Cydia ulicetana (Haworth) (was *succedana*)
Stated by J.A. Butterfield in Grinling to be 'very abundant among *Ulex*' in the SE London area, presumably including the gorse on Blackheath.

Cydia fagiglandana (Zeller) **L**
The only records of which we are aware are the imagines trapped by THF at m.v. light at the Observatory site in Greenwich Park on 6 July (one) and 22 July (two) 2004.

Cydia splendana (Hübner)
The only records of which we are aware are the following trapped by THF at m.v. light in Greenwich Park: seven on 22 July and four on 4 September 2004; plus three on 12 August 2005.

Cydia pomonella (Linnaeus) CODLING MOTH
Described in Grinling by Fenn as 'generally abundant' in the SE London area and reported from Greenwich Park by West. In recent years, THF trapped the following in Greenwich Park at m.v. light: one on 17 May, three on 7 June, five on 22 July and one on 4 September 2004, plus one on 23 June 2005.

Dichrorampha alpinana (Treitschke) **L**
Reported in Grinling from Greenwich by West. A.A. Allen (1978) reported seeing imagines flying around white garden daisies in a large rough fallow field at Blackheath Park during the 1970s. No later reports.

Dichrorampha plumbagana (Treitschke)
Stated by Fenn in Grinling to be 'generally common' in the SE London area and reported from nearby East Greenwich by West.

Dichrorampha sequana (Hübner) **L**
Reported in Grinling from Westcombe Park by Tutt.

Dichrorampha vancouverana McDunnough (was gueneeana) **L**
Stated by Fenn in Grinling to be 'common on all railway banks' in the SE London area. Allen (1978) reported that at Blackheath Park flowerheads in a large patch of yarrow were tenanted by imagines which were 'fairly active in the warm sunshine on 30 July 1977'. No later records.

Dichrorampha plumbana (Scopoli)
Stated by Fenn in Grinling to be 'generally common' in the SE London area and reported from nearby East Greenwich by West.

EPERMENIIDAE

Epermenia chaerophyllella (Goeze)
The only record is of the imago captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

PYRALIDAE

Chrysoteuchia culmella (Linnaeus)

Reported in Grinling from Blackheath by Tutt. In recent years THF trapped the following at m.v. light in Greenwich Park: sixty-three on 6 July, and sixty-five on 22 July 2004; thirty-five on 23 June and one on 12 August 2005. Imagines were also found by THF elsewhere in the Park on 6 July (two in the Wilderness) and 22 July 2004 (one at the Reservoir).

Crambus pascuella (Linnaeus)

THF trapped the following at m.v. light in Greenwich Park: two on 22 July 2004, and five on 23 June 2005. No earlier records.

Crambus lathoniellus (Zincken)

Described in Grinling as 'common throughout' SE London and reported from Blackheath by Tutt. The only recent record is of the one trapped by THF at m.v. light in the Bird Sanctuary site at Greenwich Park on 7 June 2004.

Crambus perlella (Scopoli)

Described by Tutt in Grinling as generally distributed throughout SE London. In recent years THF trapped the following at m.v. light in Greenwich Park: five on 6 July and twenty-three on 22 July 2004, plus four on 23 June 2005.

Agriphila selasella (Hübner) **L**

On 12 August 2005, THF trapped two at m.v. light in Greenwich Park's Bird Sanctuary.

Agriphila straminella (Denis & Schiffermüller)

THF trapped the following at m.v. light in Greenwich Park: two on 6 and fourteen on 22 July, one on 4 September 2004, plus fourteen on 12 August 2005. In addition, elsewhere in the Park, he found several imagines on 22 July 2004 by Croom's Hill.

Agriphila tristella (Denis & Schiffermüller)

Reported in Grinling from Blackheath and Westcombe Park by Tutt. The only report since then is of one caught by THF at m.v. light in Greenwich Park's Bird Sanctuary on 4 September 2004.

Agriphila geniculea (Haworth)

Reported in Grinling from Blackheath and Greenwich by West. K. H. Hyatt captured a specimen at Blackheath on 25 August 1952. Since then the following were trapped by THF at m.v. light in Greenwich Park: ten on 4 September 2004, and two on 12 August 2005.

Catoptria pinella (Linnaeus)

An imago of this uncommon species was taken at m.v. light at Blackheath Park in 1969 (Allen 1970*b*).

Catoptria falsella (Denis & Schiffermüller) **L**

Reported in Grinling from Blackheath ('scarce') by Fenn, Greenwich by West and Westcombe Park by Tutt. No later records.

Pediasia contaminella (Hübner) **Nb**

Barrett (1893–1907) wrote that this very local species 'has long been known to occur at Blackheath', while Tutt in Grinling reported its former occurrence in the area and appealed for recent records. Allen (1960) reported that 'it occurs here at light from mid-July to mid-August, but most sparingly, and only by odd specimens; I have never had as many as two in one night.' Burton (1961) drew attention to West's (1906) specific record of 'two at rest on (a) fence at Blackheath in September 1876; never before, nor since, have I seen this species, although I have worked for it.' Its continued survival in the district is demonstrated by THF's capture at m.v. light in Greenwich Park of the following in 2004: Bird Sanctuary: five on 6 July and eleven on 22 July; Observatory: one on 22 July.

Scoparia subfusca Haworth

Reported in Grinling from Blackheath by West. No other reports.

Scoparia pyralella (Denis & Schiffermüller)

Reported in Grinling from Blackheath by West. Recently captured by THF at m.v. light in Greenwich Park as follows: three on 7 June 2004, and four on 23 June 2005.

Scoparia ambigualis (Treitschke)

Reported in Grinling from Blackheath by West. Recently, singles were trapped by THF at m.v light in Greenwich Park's Bird Sanctuary on 7 June 2004 and on 23 June 2005.

Scoparia basistrigalis Knaggs

THF captured an imago at m.v. light at the Observatory site in Greenwich Park on 6 July 2004; he took four more at the Bird Sanctuary site on 4 July 2008.

Dipleurina lacustrata (Panzer)

Trapped by THF at m.v. light in Greenwich Park as follows: one on 7 June and two on 6 July 2004; five on 23 June 2005.

Eudonia truncicolella (Stainton)

Reported in Grinling from Blackheath and Greenwich Park by West. No later records.

Eudonia angustea (Curtis)

The only record is of the imago captured by THF at m.v. light in Greenwich Park's Bird Sanctuary on 4 September 2004.

Eudonia mercurella (Linnaeus)

Reported in Grinling from Blackheath by West and from Greenwich Park, the Greenwich Naval School Gardens and Westcombe Park by Tutt. Recently, THF trapped the following at m.v. light in Greenwich Park: one on 6 July, and thirteen on 22 July 2004; two on 23 June and two on 12 August 2005.

Acentria ephemerella (Denis & Schiffermüller) WATER VENEER

In Greenwich Park, THF trapped the following at m.v. light: eight on 22 July 2004, plus singles on 23 June and 12 August 2005. No other reports.

Elophila nymphaeata (Linnaeus) BROWN CHINA-MARK

On 5 May 1948, JFB and D.F. Owen caught five moths between them, which were flying by the Garden lake in Greenwich Park, and saw one other. No other reports.

Evergestis forficalis (Linnaeus) GARDEN PEBBLE

Described in Grinling as abundant throughout the SE London area, K. H. Hyatt captured a specimen at Blackheath on 18 May 1952. The only recent record is by THF of an imago at m.v. light in Greenwich Park's Bird Sanctuary on 7 June 2004.

Pyrausta aurata (Scopoli) **L**

Reported in Grinling from Westcombe Park by Tutt and in recent years from Greenwich Park by THF as follows: singles on 7 June and 4 September 2004, and also on 23 June 2005.

Pyrausta purpuralis (Linnaeus)

Reported in Grinling from Blackheath and Westcombe Park by Tutt. No later reports.

Pyrausta despicata (Scopoli) **L**

As per the previous species.

Sitochroa verticalis (Linnaeus) **L**

Not listed in Grinling. On 30 July 1977, A. A. Allen (1978) caught an imago at Blackheath Park. The only recent reports are of three trapped by THF at m.v. light in Greenwich Park on 6 July 2004, and one on 23 June 2005, plus three moths at the Reservoir in the Park on 8 June 2004 and a few at the same place on 24 June 2005.

Ostrinia nubilalis (Hübner) **L** EUROPEAN CORN-BORER

Since the 1930s this formerly rare immigrant has become established in the London area on waste ground in the vicinity of the Thames. THF trapped singles at m.v. light in Greenwich Park on 7 June and 22 July 2004, and also on 23 June 2005.

Eurrhypara hortulata (Linnaeus) SMALL MAGPIE

Described in Grinling as abundant throughout the SE London area and still so in the Blackheath district in the 1940s and 1950s (JFB and D.F. Owen) and in the 1960s and 1970s (Allen 1970*b*). On 30 August 1983, JFB and DFO found the larvae numerous on stinging nettle growing in and around the Vanbrugh Pits in the north-east corner of Blackheath, close to Greenwich Park. THF trapped one moth at m.v. light in the Park on 23 June 2005, and a further five on 4 July 2008.

Phlyctaenia coronata (Hufnagel)

Reported in Grinling from Blackheath and Westcombe Park by Tutt and from Greenwich by Adkin. Recently, THF trapped the following at m.v. light in Greenwich Park: two on 6 July and four on 22 July 2004; one on 12 August 2005.

Udea lutealis (Hübner)

Reported in Grinling from Westcombe Park by Tutt. No later records.

Udea prunalis (Denis & Schiffermüller)

Reported in Grinling from Westcombe Park by Tutt and from nearby Lewisham by West. No later records.

Udea olivalis (Denis & Schiffermüller)
Reported in Grinling from Blackheath and Westcombe Park by Tutt. Recenty, THF caught the following at m.v. light in Greenwich Park's Bird Sanctuary: three on 7 June 2004, and five on 23 June 2005.

Udea ferrugalis (Hübner) RUSTY-DOT PEARL
Reported in Grinling from Blackheath (often common at light) by Fenn and from Greenwich by West. No later records.

Nomophila noctuella (Denis & Schiffermüller) RUSH VENEER
This immigrant species appears in variable numbers. In Grinling it was reported from Blackheath by West and from Westcombe Park by Tutt. The only subsequent record of which we are aware is of one seen by D.F. Owen in Greenwich Park's Flower Garden on 23 August 1947, an especially notable year for immigrant Lepidoptera.

Pleuroptya ruralis (Scopoli) MOTHER OF PEARL
Reported in Grinling to be abundant among nettles throughout the SE London area. JFB and D.F. Owen found it to be still so in the 1940s and 1950s, including Blackheath and Greenwich Park. More recently, THF trapped the following in Greenwich Park at m.v. light: three on 22 July 2004; one on 23 June and 10 on 12 August 2005.

Palpita vitrealis (Rossi)
An example of this scarce immigrant from southern Europe was reported from Blackheath on 11 October 1959 (Plant 1986).

Hypsopygia costalis (Fabricius) GOLD TRIANGLE
Reported in Grinling from Blackheath, Greenwich and Westcombe Park by Tutt. THF trapped the following at m.v. light in Greenwich Park: three on 22 July 2004; five on 23 June 2005.

Orthopygia glaucinalis (Linnaeus)
Reported in Grinling from nearby Lewisham by Adkin and, much more recently, from Greenwich Park by THF who trapped the following at m.v. light: one on 7 June, three on 6 July, two on 22 July 2004; three on 23 June and one on 11 October 2005.

Pyralis farinalis (Linnaeus) Meal Moth
Reported in Grinling from Greenwich by Adkin and West. In Greenwich Park, THF trapped the following at m.v. light: singles on 6 and 22 July 2004 in the Bird Sanctuary, and one at the Observatory site on 12 August 2005.

Aglossa pinguinalis (Linnaeus) **L** LARGE TABBY
Reported in Grinling from Greenwich and Westcombe Park by Tutt. No later records.

Endotricha flammealis (Denis & Schiffermüller)
Reported in Grinling from Blackheath and Westcombe Park by Tutt. K. H. Hyatt collected a specimen at Blackheath on 7 July 1952. In recent years, THF captured at m.v. light in Greenwich Park: two on 6 July and 17 on 22 July 2004, plus one on 11 October 2005.

Galleria mellonella (Linnaeus) **L** WAX MOTH
THF trapped the following at m.v. light in Greenwich Park: one on 22 July and two on 4 September 2004, plus one on 23 June 2005. No other reports.

Aphomia sociella (Linnaeus) BEE MOTH
In Greenwich Park, THF trapped the following at m.v. light: five on 7 June, and singles on 6 and 22 July 2004; four on 23 June 2005. No earlier reports.

Conobathra repandana (Fabricius)
THF trapped the following at m.v. light in Greenwich Park: three on 6 July and six on 22 July 2004, plus four on 23 June 2005. No earlier reports.

Acrobasis consociella (Hübner)
The only report of this species known to us is the imago captured by THF at m.v. light in Greenwich Park Bird Sanctuary on 23 June 2005.

Trachycera advenella (Zincken)
THF captured the following in Greenwich Park at m.v. light: four on 22 July 2004; one on 12 August 2005. No earlier reports.

Phycita roborella (Denis & Schiffermüller)
This species was trapped at m.v. light by THF in Greenwich Park: four on 6 and four on 22 July 2004; four on 12 August 2005. No earlier reports.

Myelois circumvoluta (Geoffroy) **L** Thistle ermine
Reported by West in Grinling from 'Greenwich Marshes, etc.' Trapped at m.v. light by THF in Greenwich Park as follows: three on 7 June 2004 and five on 23 June 2005.

Apomyelois bistriatella (Hulst) **Nb**
Examples of this very rare moth were taken at m.v. light at Blackheath Park by Allen (1975*b*) on 21 June 1959 and 7 July 1970.

Euzophera cinerosella (Zeller) **Nb**
The only record of which we are aware is of one attracted on 20 June 1960 to the m.v. light trap operated by A. A. Allen (1969*a*) in his then garden at Blackheath Park.

Euzophera pinguis (Haworth) **L**
Reported in Grinling from nearby Lewisham ('sparingly') by Adkin. Single imagines trapped at m.v. light by THF in Greenwich Park on 23 June and 12 August 2005.

Ephestia elutella (Hübner) Cacao moth
Reported in Grinling from Greenwich and Westcombe Park by Tutt. One recorded in Greenwich Park by THF at m.v. light at the Bird Sanctuary site on 4 July 2008.

Ephestia parasitella Staudinger **L**
Trapped at m.v. light by THF in Greenwich Park as follows: six on 7 June, four on 6 July, one on 22 July 2004, plus seven on 23 June, and one on 12 August 2005. No earlier records.

Plodia interpunctella (Hübner) Indian meal moth
The only record known to us is the imago captured by THF at m.v. light at the Observatory site in Greenwich Park on 11 October 2005.

Homoeosoma sinuella (Fabricius)
Trapped at m.v. light by THF in Greenwich Park as follows: two on 7 June, two on 6 July and four on 22 July 2004, plus 54 on 23 June 2005. No earlier reports.

Homoeosoma nimbella (Duponchel) **pRDB**
Reported in Grinling from Westcombe Park by Tutt. No other records.

Phycitodes binaevella (Hübner)
The only record known to us is of the imago captured by THF in Greenwich Park's Bird Sanctuary on 6 July 2004.

PTEROPHORIDAE

Cnaemidophorus rhododactyla (Denis & Schiffermüller) **RDB3**
Reported in Grinling from Lewisham, adjacent to Blackheath, by Stainton. No other records.

Amblyptilia acanthadactyla (Hübner) **L**
Single moths trapped at m.v. light by THF in Greenwich Park as follows: Bird Sanctuary: 12 April 2004, 23 June and 12 August 2005; Observatory site: 23 June 2005.

Platyptilia gonodactyla (Denis & Schiffermüller) **L**
Reported in Grinling from the Blackheath district and Westcombe Park by Tutt. Recently, an imago was trapped by THF at m.v. light in Greenwich Park's Bird Sanctuary on 17 May 2004.

Platyptilia pallidactylla (Haworth)
Reported in Grinling from Blackheath and Westcombe Park by Tutt. At Blackheath Park, Allen (1978) caught an imago on 30 July 1977. No later records.

Stenoptilia pterodactyla (Linnaeus)
Reported in Grinling by Adkin as occurring 'sparingly' at Lewisham, adjacent to Blackheath.

Pterophorus pentadactyla (Linnaeus) White plume moth
Reported in Grinling to be 'abundant throughout' SE London and specifically recorded from Greenwich and Westcombe Park by Tutt. K. H. Hyatt collected a specimen at rest at Blackheath on 10 August 1958.

Emmelina monodactyla (Linnaeus)
Reported in Grinling from Blackheath and Westcombe Park by Tutt and from Greenwich by Adkin. K. H. Hyatt collected a specimen in Greenwich Park on 12 October 1952. Singles trapped by THF at m.v. light in Greenwich Park as follows: 4 September 2004, and 23 June and 11 October 2005.

Butterflies

Twenty-eight species have been recorded naturally in the area since 1800, and of these, twenty-six in Greenwich Park. During his survey of 2004 to 2006, THF recorded sixteen species in the Park, including purple hairstreak, which was apparently new to the area.

HESPERIIDAE

Thymelicus sylvestris (Poda) SMALL SKIPPER

As far as we are aware, there are no earlier records of this species in the Blackheath-Greenwich Park area than 1945. JFB encountered several in the south-east corner of Greenwich Park in 1946 and 1947, but not subsequently. Owen and Owen (1950) stated that 'small numbers breed throughout the Park, but it appears to be decreasing.' In the late 1970s, A.A. Allen knew of no recent records from the area (Chalmers-Hunt 1960–81) and for many years it appeared to be absent, though perhaps overlooked. Then, in the summers of 2004 and 2005, THF (Freed 2004, 2006*a*) discovered it present again in Greenwich Park, including on One Tree Hill. At Blackheath, D.F. Owen (pers. comm.) caught one on a bomb-site on 25 July 1947 and JFB also regularly found small skippers on the bomb-sites there at that period, including the one near the Prince of Wales Pond (Burton 1979).

Thymelicus lineola (Ochs.) ESSEX SKIPPER

In the time of Tutt, West and Stanley Edwards, around the end of the nineteenth century, the Essex skipper was unknown in the Greenwich district, although it is possible that it was present on the Greenwich Marshes and overlooked. It was first noticed in the south-east London area at Eltham in 1911 (Plant 1987) and may have spread to the Blackheath district during the years of expansion between 1930 and 1945. Certainly JFB and D.F. Owen found it well established and numerous on Blackheath in 1946, and especially so in the hot summer of 1947. It particularly flourished on some of the bomb-sites, such as those near the Prince of Wales Pond and in Mycenae Road, and also where some of the old gravel-pits had been filled with debris from wartime bombed areas and had become covered with a lush growth of Oxford ragwort, wall rocket, melilots, thistles and many other ruderal plants and wild grasses. These sites were 'cleared-up' by the authorities during the 1950s (Teagle 1997, Burton 2001). It was also plentiful in July 1947 on a former large bomb-site opposite the Prince of Wales Pond and in an overgrown garden of a bombed house in Mycenae Road on the leafy eastern boundary with Charlton (Burton 1979). JFB also found it in those years apparently breeding in the relatively wild south-east corner of Greenwich Park. Owen and Owen (1950) considered Essex skippers to be decreasing there and this was undoubtedly the case by 1949. However, it was still to be found occasionally as late as 1957 on suitable bomb-sites at Blackheath adjacent to the open heath (Burton 1979) and it may have survived even longer in small, isolated colonies there as Allen saw single imagines in 1964 (Allen 1967) and in 1966 (Chalmers-Hunt 1960–81). Allen (1997) stated that Essex skippers arrived at Blackheath long ago and became locally the most abundant butterfly. He had reported (Allen 1978) that on 20 July 1977 they were 'common in a small isolated area just inside a large rough fallow field' very near his former house at Blackheath Park. He also saw imagines in 1979 near the Thames bank between Greenwich and Charlton, and also at nearby Kidbrooke. In early September 1989, during a visit to Greenwich, JFB specifically looked for *lineola* in its former haunts on Blackheath without success. However, Roper (1991) reported that a colony of skippers, presumably this species, occurred at that time 'in a small area of rough grasses and bushes alongside the up platform at Greenwich Station' in a built-up area a few streets away from the north-west corner of Greenwich Park. Then in the summers of 2004 and 2005, THF discovered a colony of Essex skippers in the Park on the slopes of One Tree Hill. The Essex skipper has, of course, in recent years been rapidly expanding it range again in south-east England, apparently in response to the current climatic warming, and any isolated colonies that survived undetected in the Blackheath area from the earlier 1930–1947 period of expansion may now be recolonizing their former haunts after years of scarcity between 1950 and the 1990s.

Ochlodes faunus (Turati) (*venata*) LARGE SKIPPER

Although reported in the past from Blackheath and neighbouring areas by Fenn (1895) and Tutt (Grinling et al. 1909), there were apparently no published records of its occurrence in Greenwich Park until Owen and Owen (1950) reported it to be 'the most abundant of the Hesperiidae, breeding in considerable numbers on the grassy borders around the ornamental flower gardens' in the south of the Park. JFB also found it commonly, sometimes in abundance, in the Flower Gardens, the Wilderness, the bird sanctuaries and the Superintendent's Paddock from 1946 to 1951, where, as well as feeding from the blossoms of cultivated plants, it also visited those of rosebay willowherb and brambles. In the latter year, JFB noted in his journal that it was present in considerable numbers in the Paddock and the Wilderness on 1 July. Subsequently numbers declined. As far as we are aware, no other published reference to the large skipper's occurrence in the Park was made until June 2005 when J. Hawksley and THF (Freed 2006*a*) reported a singleton 'on the grassy slopes of One Tree Hill in the company of small and Essex skippers'.

On 9 July 1946 and on 13 July 1947 JFB saw many large skippers in the garden of a bombed house in Mycenae Road, Blackheath, and at least one on 28 July 1947 on the bomb-site by the Prince of Wales Pond on the Heath. At Blackheath Park, Allen (1970*b*) reported that the species was common up to 1970 in the garden of his house where he resided up to 1973; he first noticed it there 'some time before 1950'. On a visit to Blackheath on 30 June 1989, JFB saw four adults visiting the flowers of black horehound, creeping thistle and spear thistle in the Vanbrugh Pits, close to the wall of Greenwich Park.

PIERIDAE

Colias croceus (Geoffroy) CLOUDED YELLOW

This well known immigrant was described as common in the Blackheath and Greenwich districts in good migrant years (Grinling), but was not listed by Stanley Edwards in Webster. Owen and Owen (1950) stated that it occurred almost every year in small numbers, but that in 1947 it was 'abundant'. In 1946 JFB saw only one in Greenwich Park, on 12 July, but in 1947 it was certainly abundant at Blackheath and Greenwich Park as almost everywhere else in southern England. JFB remembers sitting in his classroom in the Roan School, adjacent to Greenwich Park, its windows wide open on those hot summer days of 1947 and seeing a constant stream of clouded yellows flying past. He longed to be outside! The *helice* form of the female was quite frequent that year: D.F. Owen caught examples on Blackheath on 9 and 21 September and JFB captured one in Greenwich Park on 15 October that was nectaring at a dahlia in the Flower Gardens. In 1949 there was another strong influx of clouded yellows into southern England: K.H. Hyatt saw a female on Blackheath on 9 June, and from a train JFB saw a male flying along the railway embankment between Maze Hill and Westcombe Park stations on 1 October. The latest record of which we are aware is a single female of form *helice* seen at Greenwich in 1966 (Plant 1986). Not recorded by THF.

Gonepteryx rhamni (Linnaeus) BRIMSTONE

Stanley Edwards, who lived at Kidbrook Lodge, Blackheath, included the brimstone in the list of butterflies seen in Greenwich Park that he supplied to Webster, and, although Blackheath and Greenwich Park were not specifically mentioned by them, it was stated in Grinling that the brimstone was fairly common in the south-east London area generally. Chalmers-Hunt (1960–81) mentioned that a male taken at Blackheath in March 1870 in which the forewings and right hindwing were 'broadly but unequally suffused with bright rose-colour or scarlet' was exhibited at a meeting of the (now Royal) Entomological Society of London in 1871. Owen and Owen (1950) reported that it occurred annually after hibernation in Greenwich Park and exceptionally in the autumn, and that it formerly bred in nearby Lewisham, at which time it was also more frequent in the Park. The statement by de Worms (1950) that the brimstone was common at Blackheath and in Greenwich Park in 1946 was not strictly accurate: JFB's only records are of two males seen in 1947: one in the Park on 7 May and the other on the Heath on 27 July. As far as we are aware, the larval foodplants, common buckthorn and alder buckthorn, are not present in our area, and this is borne out by the distribution maps in Burton (1983). Not recorded by THF.

[*Aporia crataegi* (Linnaeus) BLACK-VEINED WHITE

Apparently, Tutt was rearing larvae of this nowadays extinct butterfly in England, because Chalmers-Hunt (1960–81) mentioned that two large broods escaped from his garden in Westcombe Park, close to Blackheath, in 1897. We are unaware of any reports of them being sighted subsequently.]

Pieris brassicae (Linnaeus) LARGE WHITE

Grinling listed the large white as abundant throughout the SE London area, but less so than formerly. Some forty years later, Owen and Owen (1950) stated that it was common, breeding in large numbers on allotments and in gardens surrounding

Greenwich Park. It was certainly numerous from 1946 to 1951, and especially so in 1947. Since then it has generally been seen in smaller numbers and is subject to population fluctuations. Over the years 1985 to 2006, large whites were recorded in Greenwich Park by L. and G. Chandler and THF. In 1969, Allen (1970*a*) reported that the species was frequent at Blackheath, especially the second generation.

Pieris rapae (Linnaeus) SMALL WHITE
Also described in Grinling as 'abundant throughout'. Owen and Owen (1950) reported it to be, like the last species, common and breeding in large numbers on allotments and in gardens. The wartime allotments in the north of Greenwich Park, where *P. brassicae* and *P. rapae* used to breed in those years, were restored to grassland by the early 1950s. JFB also saw *rapae* in large numbers in the Park and at Blackheath during the period 1946 to 1951 and then less commonly up to 1959 when he left the district. On his return visits in late summer in 1983 and 1989, and early May 2000, it was to be seen in relatively small numbers. In the period 2003–06 it was noted in Greenwich Park by N. Reeve and THF. Allen (1970*a*) described it as frequent at Blackheath in 1969, especially the second generation.

Pieris napi (Linnaeus) GREEN-VEINED WHITE
Included by Stanley Edwards in his Greenwich Park list in Webster. This species was rated in Grinling as 'common throughout, but less abundant than' the small white, a view shared forty years later by Owen and Owen (1950) and JFB in the years 1946–1951. On 26 April 1948 the latter caught a dwarf female in Greenwich Park's Wilderness. The species was also listed for the Park over the period 1985–2006 by L. and G. Chandler and THF. Allen (1967) stated that *napi* was the commonest 'white' in his Blackheath Park garden and in 1969 he (Allen 1970*a*) recorded it frequently, especially the second generation. When JFB visited Blackheath on 7 September 1989 he saw several in the Vanbrugh Pits area.

Anthocharis cardamines (Linnaeus) ORANGE-TIP
Fenn, writing of his experiences collecting Lepidoptera in the south-east London area dating back to 1860, stated that the orange-tip 'used to be very abundant, but, although not extinct, it is decidedly scarce now'. Adkin reported that it was fairly common at Lee and Lewisham (adjacent to Blackheath) up to 1876 and Tutt in Grinling reported that it occurred as late as 1885 in Westcombe Park and at Shooters Hill, thereby implying that it had subsequently died out. The orange-tip was, however, included in the Greenwich Park list Stanley Edwards supplied to Webster. By around 1920 it was apparently staging something of a recovery, as by the 1940s it was again fairly common at Shooters Hill (Burton 1992). Owen and Owen (1950) stated that it bred commonly in the Lewisham area up to and including 1946, and was then a frequent visitor to Greenwich Park, but had subsequently become very irregular, the nearest definite breeding locality being Shooters Hill (5 km ESE). JFB's only sightings in the area under review were a female on a bomb-site on the southern side of Blackheath on 22 April 1946, a male in the Wilderness in Greenwich Park on 21 May 1948 and a male flying past the Royal Standard public house at Blackheath on 2 June 1949. Not recorded by THF in the Park though apparently it does occur locally in private gardens.

In more recent years, A. A. Allen reported (Chalmers-Hunt 1960–81) seeing a male at Blackheath in June 1977 and subsequently (Allen 1997) stated that it had appeared close to that district in an area at Charlton where its foodplants grow.

LYCAENIDAE

Callophrys rubi (Linnaeus) GREEN HAIRSTREAK
Around 1900 the green hairstreak seems to have been a scarce and local butterfly in the SE London–NW Kent area judging by the information given in Grinling. However, it appears in the Greenwich Park list Stanley Edwards gave to Webster, and on 26 May 1947 JFB saw a single butterfly flying around an oak in the Wilderness in the Park — Chalmers-Hunt (1960–81) incorrectly gave the year as 1948. Nevertheless, it certainly no longer breeds in Greenwich Park or on Blackheath, if it ever did so, and the above individual probably strayed from Shooters Hill, where D.F. Owen (pers.comm.) observed the species in 1947.

Neozephyrus (Quercusia) quercus (Linnaeus) PURPLE HAIRSTREAK
Almost incredibly it seems, in the summer of 2004, M. Newland and THF (Freed 2004; 2006*a*) found several purple hairstreaks flying around the tops of the oak trees behind the Wildlife Centre bordering the Wilderness in Greenwich Park, the first time

the species has ever been recorded there. Is it possible that D. F. Owen, J. E. Owen, K. H. Hyatt and JFB overlooked it there in the 1940s and 1950s? It could have been the case, because this relatively natural part of the Park, with its old oaks, provides a suitable habitat. Even so, we did not expect to find it there and did not look out for it, although all of us were also birdwatchers and often looked into the treetops for birds, so it is difficult to believe that we would have missed purple hairstreaks flying around them.

The nearest known locality for *quercus* in the past was Shooters Hill (5 km ESE), where it was described by A. H. Jones as abundant in 1858 and 1859 (Grinling) but was considered extinct there by 1890 (Fenn 1895, Burton 1992).

Lycaena phlaeas (Linnaeus) SMALL COPPER

The small copper was included by Stanley Edwards in his Greenwich Park list in Webster and reported to be common at Blackheath by Tutt in Grinling. In the 1940s and 1950s it was fairly common most years on the Heath and on adjacent bomb-sites, and in the Park, especially in the south-east corner and on the northern slopes of the latter. It was especially numerous in the fine summer of 1947, particularly in August and September. For instance, on 9 September D.F. Owen (pers.comm.) counted no less than twelve on the then bomb-site opposite the Prince of Wales Pond at Blackheath.

A. A. Allen (1967, 1970*b*) reported that *phlaeas* appeared in his then garden at Blackheath Park in most years and in 1969, he (1970*a*) saw several imagines visiting mint and thistle flowers there from 7–10 August and again between 19 September and 13 October. One slightly deformed, limp individual had apparently emerged at the edge of an uncut lawn where the larval foodplant abounded. On 7 September 1989, in the course of a visit to Blackheath, JFB saw four fresh imagines (two males and two females) in the Vanbrugh Pits area adjacent to Greenwich Park, and watched one of the females oviposit on a small plant of sheep's sorrel. Much more recently, THF (2004, 2006*a*) found small coppers still present in 'reasonable numbers on the acid grassland' in Greenwich Park and it was also recorded there by L. and G. Chandler over the period 1985–2001, and by N. Reeve in 2003.

Aricia agestis (Denis & Schiffermüller) BROWN ARGUS

In Grinling, A. H. Jones was reported to have caught a single specimen in Greenwich Park on 27 July 1859, the only record known to us.

Polyommatus icarus (Rott.) COMMON BLUE

West described the common blue as abundant at Brockley and many other places in south-east London, an assessment supported by Tutt in Grinling. It was therefore, presumably, at least fairly numerous in the Blackheath area at that period and was included by Edwards in his Greenwich Park list (Webster 1902). By the 1940s it had declined in numbers and Owen and Owen (1950) described it as 'a sparsely distributed species' in Greenwich Park, 'now decreasing', but breeding in small numbers on the common Papilionaceae on the northern slopes and in the deer enclosure. In the 1950s JFB found it still it breeding in small numbers in the Wilderness and the Superintendent's Paddock, as did J.E. Owen at Blackheath in 1948 (per D.F. Owen). On a visit to Blackheath on 7 September 1989, JFB encountered two males in the Vanbrugh Pits area in the north-east corner of the Heath. Twenty years earlier, A.A. Allen (1970*a, b*) reported that several imagines of both sexes frequented the flowering mint and thistles in his garden in Blackheath Park during August 1969.

More recently, L. and G. Chandler recorded common blues in Greenwich Park during the period 1985–2001, and N. Reeve noted them there in 2003. In 2006 THF reported its continued presence in the Park, finding several on top of the old reservoir where the larval foodplant, bird's-foot trefoil, is abundant.

Celastrina argiolus (Linnaeus) HOLLY BLUE

Included by Edwards in his Greenwich Park list in Webster and described by Tutt in Grinling as 'common throughout in woods and gardens in May and August' at Blackheath and Westcombe Park. However, Fenn, having stated that the holly blue was 'fairly common in our lanes and gardens in the spring', bemoaned that 'We never see it now close [to] home [he lived in Lewisham], and I should say that Chislehurst is the nearest spot to London in this direction where it is found.' The holly blue is, of course, well known to fluctuate in numbers over the years and at times becomes very scarce. By 1900–1901 its populations seem to have recovered and by the time JFB started observing Lepidoptera in the late 1940s it was quite numerous, including at Blackheath and in Greenwich Park. In April and September 1946, for instance, he and

D.F. Owen saw holly blues on a large bomb-site at Belmont Hill, Blackheath, and in July 1947 JFB saw several in gardens on the eastern side of Blackheath. Owen and Owen (1950) considered it to be the commonest of the Lycaenidae in Greenwich Park, breeding in 'considerable numbers on the holly and the ivy, both of which are common in the Park'. It continues to be seen there: L. and G. Chandler recorded holly blues in 1985–2001, and in 1990 Roper (1991) reported that it was 'abundant' and 'also in some of the suburban streets in the area'. In 1991 he saw his first one that year in the Park on 21 July (Roper 1992). During a visit to Greenwich Park on 9 May 2000, JFB watched one flying along an ivy-covered wall by the Ranger's House, and THF included the species in his Park list for the years 2004–2006.

At Blackheath, A. A. Allen (1970*a*) reported that, following a revival in 1966 (Allen 1967), the holly blue was very scarce in 1969; he saw 'no more than two of the first brood (13 & 16 May) and none at all of the second'. However, in 1970 (Allen 1970*b*) it made an 'excellent recovery and, in both broods, was almost frequent'. In 1977 he saw one flying around a boundary hedge by a large, rough fallow field at Blackheath Park (Allen 1978).

NYMPHALIDAE

Vanessa atalanta (Linnaeus) RED ADMIRAL

Formerly, this species used to be entirely dependent upon immigration from southern Europe for its survival in Britain, but in the past twenty years or so, almost certainly due to global warming, more and more imagines and larvae survive the winter here (Burton 2006). However, being primarily migratory, its numbers vary from year to year. In the early years of the twentieth century, Edwards included it in his Greenwich Park list in Webster, and West reported that he used to find the larvae very commonly on the stunted nettles that grew in the gravel pits on Blackheath. Owen and Owen (1950) regarded the red admiral as the most abundant of the immigrant butterflies, except in 1945, when it was exceeded in numbers by the painted lady. They stated that it abounded in the Flower Gardens of Greenwich Park during the autumn, when it was attracted by the nectar-bearing type of dahlia flowers, which at that time were grown in profusion there. This was JFB's experience too in the years 1946–1953. In 1946, D.F. Owen reported seeing 'hundreds on fine September days' in the Park. On one occasion, 13 August 1950, JFB and D.F. Owen found several larvae on stinging nettles in the Wilderness in Greenwich Park, where D.F. Owen (pers.comm.) had watched a female ovipositing the previous year on 25 June.

Much more recently, red admirals have been seen in the Park by A.A. Allen (1970*a*), L. and G. Chandler (1985–2001), N. Reeve (2003), and THF (2004–2006).

At Blackheath, JFB, K.H. Hyatt, D.F. Owen and J.E. Owen used to see many imagines nectaring at the *Buddleia davidii* bushes on the several bomb-sites around the Heath in 1946–1949. In 1960, A. A. Allen informed Chalmers-Hunt (1960–81) that red admirals were much more numerous in that year than of late, and in 1968 and 1969 reported (Allen 1969*b*, 1970*a*) them to be numerous in the autumn there, but scarce in 1970 (Allen 1970*b*). Much more recently, in 1991, Roper (1992) mentioned that some were present at Maze Hill railway station, close to the north-eastern corner of Greenwich Park.

Vanessa cardui (Linnaeus) PAINTED LADY

Being a veritable migrant, the painted lady is uncertain in its appearances, sometimes arriving in abundance and in other years in very small numbers, if at all. This was of course the case in the past, as stated in Grinling. It was listed for Greenwich Park by Edwards in Webster, and Owen and Owen (1950), reporting on the Park's butterflies at that time, commented that it was present in unprecedented numbers in the late summer of 1945 and that the larvae were often found on nettles and thistles in the Wilderness in the good years. JFB remembers it being especially numerous in the Park in 1947, particularly in late September, as well as on and around Blackheath. For instance, D. F. Owen (pers.comm.) counted thirteen on the bomb-site by the Prince of Wales Pond, Blackheath, on 9 September and his brother, J. E. Owen, twenty at the same place on 15 September. In 1952 there was another impressive and early immigration. JFB's most recent record of its presence in the area is the note by Allen (1970*a*) that he saw several at Blackheath Park in the autumn of 1969, but has no doubt that it has occurred here in most years.

In more recent years painted ladies have been seen in Greenwich Park by L. and G. Chandler in the period 1985–2001, by N. Reeve in 2003 and by THF from 2004 to 2006.

Aglais urticae (Linnaeus) SMALL TORTOISESHELL

In former times (e.g. at the beginning of the twentieth century, when, for example, in 1907 Tutt in Grinling reported its occurrence at Blackheath and Westcombe Park, and Edwards listed it for Greenwich Park in 1902), the small tortoisehell was a common butterfly. It was still so in the south-east London area in the 1940s and the 1950s, despite annual fluctuations. However, in recent years it has become scarce, not only in this area and Britain generally, but over much of north-west Europe for reasons not yet fully understood. JFB last remembers it in profusion in the autumn of 1958 and it was not reported from Greenwich Park over the period 1985–2006 (Freed 2006*a*). Writing of Greenwich Park in the 1940s, Owen and Owen (1950) stated that it bred freely in 'waste areas and in the deer enclosure' (The Wilderness) and was 'always common in the ornamental gardens'. JFB also remembers this being the case from 1946 to 1958. Some idea of numbers in 1947 can be gained from the fact that D.F. Owen estimated thirty-five to forty present in the Park's Flower Gardens on 23 August and counted thirty at the bomb-site opposite the Prince of Wales Pond on Blackheath on 9 September. Owen and JFB found larvae on nettles in the Park in almost every year from 1946 to 1951 inclusive, especially around the old gravel-pit in the Wilderness, which has since been filled in. The latter also found larvae on nettles in those years on Blackheath, where the butterfly was also to be seen frequently.

More recently, at Blackheath in 1968, A. A. Allen (1969*b*) reported that small tortoiseshells had 'had a much better season here than for a long time past'. The next year he (Allen 1970*a*) found them numerous that autumn, especially on Michaelmas daisies. In 1977 they were again 'plentiful' on 30 July at Blackheath Park, having been 'extremely erratic in this district before 1977, and indeed has been so for many years' (Allen 1978). In 1991, Roper (1992) saw some at Maze Hill railway station, close to the north-east corner of Greenwich Park, on 14 September. In 1996, Allen (1997) reported that, apart from a small colony of larvae at nearby Kidbrooke, he had seen only two imagines that year.

Aglais polychloros (Linnaeus) LARGE TORTOISEHELL

Up to the early years of the twentieth century, the large tortoiseshell, although subject to periodic population fluctuations, was apparently still not uncommon in the south-east London/north-west Kent area (Grinling). However, it was already showing signs of a decline, according to Fenn, who wrote that he had seen no signs of it for a very long time. Edwards included it without comment in his Greenwich Park list in Webster. Owen (1949) and Owen and Owen (1950), writing of Greenwich Park in the 1940s, stated that it had occurred at Lewisham in 1944, 1946 and 1947, two miles (some three km) to the south. It was also reported from Lewisham in April 1948 (de Worms 1950) and one was reported from Charlton in the Borough of Greenwich in early April 1975 (Plant 1986). In addition, there are several other doubtful records. Apart from occasional reports of apparent immigrants, the species is generally regarded as extinct as a native British butterfly. In fact, Chalmers-Hunt (1960–81) and Owen (1953) concluded that immigration in the autumn was the most likely explanation of the appearance and remarkable fluctuations of the large tortoiseshell in England.

[*Aglais antiopa* (Linnaeus) CAMBERWELL BEAUTY

There are no natural occurrences of this butterfly on record from Blackheath and Greenwich Park, but on 24 July 1956, the late L. Hugh Newman (pers.comm.) released between fifty and sixty imagines in the Park in an unsuccessful attempt to establish the species there. The event was filmed in colour by Pathe Pictorial and it was also featured with a photograph in early September in the London newspapers *The Evening Star* and *The Evening Standard*.]

Inachis io (Linnaeus) PEACOCK

Edwards included this species in his Greenwich Park list (Webster 1902) and in 1907 Tutt described it as generally distributed in the south-east London area in Grinling, and specifically mentioned Westcombe Park and Blackheath, but it seems to have been rather scarce at that time. Fenn stated that it 'was formerly common, especially on the marshes, where the larvae were abundant; now we rarely see the imago, and I can only recollect the capture of one or two broods of larvae for a long while past'. West, who lived all his life in Greenwich, wrote: 'I have not seen larvae for years, yet, during the month of June, thirty years ago, had I been asked for a brood of larvae, or half a dozen broods, I could have put my hands on them, in this neighbourhood'. In Greenwich Park, Owen and Owen (1950) reported that the peacock butterfly was not then breeding, but had done so in the past. Although they stated that it was sometimes abundant in the Flower Gardens there, JFB's experience was that it was exceptional to see more than half-a-dozen on any one day, even in the hot summer of 1947. However, it was not unusual to see at least that quantity at the buddleia bushes on the bomb-sites around Blackheath in that year. Sadly, by the 1960s A.A. Allen (1967) lamented that at Blackheath it had been absent for so long that the appearance of one on 14 August 1965 was 'a welcome surprise'. He reported that it was rare again in 1969, though he had seen one on buddleia in August in his garden in Blackheath Park. He saw another in 1970 but it was apparently still scarce there in 1998 (Allen 1970*a* and *b*, 1999). In Greenwich Park it was recorded by L. and G. Chandler in the period 1985–2001, but not in the years 2004–2006 (Freed 2006*a*). On a visit to the Park on 9 May 2000, JFB saw one basking on a sunlit laurel leaf by the Ranger's House.

Polygonia c-album (Linnaeus) COMMA

At the time (1907) Tutt compiled his notes on the Lepidoptera of the south-east London/north-west Kent area for Grinling, the comma butterfly had become very rare, not only here, but over most of England, and he apparently knew of no records for the Blackheath-Greenwich districts. A recovery began in the 1920s and in 1926 Allen (1999) clearly remembered seeing several on Michaelmas daisies in the garden of his preparatory school at Blackheath in the early autumn term — late September or early October. By 1945 it had become fairly plentiful. Since that year it has been frequently seen in most years at Blackheath and in Greenwich Park. On 26 April 1948 JFB watched three females ovipositing on stinging nettles in the Park Superintendent's Paddock and saw two others in the Wilderness, the maximum number he had ever seen in the Park at one time. His last personal sighting in the Park was of one nectaring from dwarf Michaelmas daisies in the Flower Gardens on 25 October 1958, at which flowers A.A. Allen reported one on 18 September 1960 (Chalmers-Hunt 1960–81). In 1968–1970, Allen (1969*b*, 1970*a*, 1990) considered commas to be scarce at Blackheath; he saw only occasional ones. At Greenwich Park it was recorded by L. and G. Chandler in 1985–2001 and by THF in 2004–2006 (Freed 2006*a*).

Argynnis aglaja (Linnaeus) DARK GREEN FRITILLARY

An apparent wanderer from the North Downs, one was captured by D.F. Owen (pers.comm.) in July 1945 at buddleia on the large bomb-site that used to exist opposite the Prince of Wales Pond at Blackheath — it has since had a block of flats built upon it.

Pararge aegeria (Linnaeus) SPECKLED WOOD

Widely distributed and fairly plentiful in the woods of north-west Kent up to the middle of the nineteenth century, the speckled wood subsequently declined and had become very local by the end of it. Fenn wrote that it seemed 'to have disappeared from the Lee, Eltham and Bexley district', while West gave Shooters Hill as a former locality for it. Around 1940 it began recolonizing north-west Kent and by the early 1980s had reappeared at Shooters Hill. At Blackheath, A.A. Allen (Chalmers-Hunt 1960–81) encountered an apparent vanguard wanderer as early as 1955 and stated that it had actually reached Blackheath by 1963 (Allen 1967, 1969*b*, 1970*a*). Eventually, by the early 1990s it had spread into the open spaces of Woolwich and Charlton, on the edge of the Blackheath district, occurring in 'exceptional profusion' there in 1994, according to Allen (1994). Somewhere in the period 1985 to 2001, L. and G. Chandler recorded its presence in Greenwich Park (Freed 2006*a*) and when JFB visited the Park on 9 May 2000 he was delighted to see two imagines basking on sunlit leaves in the Woodland Walk, bordering the Wilderness. It was also noted in the Park by N. Reeve in 2003. Apparently, the speckled wood is now well established there, featuring well on the transects which are walked by THF around One Tree Hill and at Crooms Hill (Freed 2004, 2006*a*).

Lasiommata megera (Linnaeus) WALL

Like the previous species, the wall butterfly was also considered by Fenn to have disappeared in the preceding years from its former haunts and was assessed as 'rather local' in 1907 by Tutt in Grinling. It did not appear on Edwards's Greenwich Park list in Webster. After the First World War it made something of a comeback in north-west Kent: JFB remembers seeing it quite frequently in the Chislehurst district in the early 1940s and K. H. Hyatt saw it in the 1940s in his garden at Grove Park. As regards Greenwich Park, Owen and Owen (1950) commented that it was not really common in the late 1940s, but certainly bred, and was not merely a stray from Blackheath. At that period it was most frequently seen in the Flower Gardens and the Wilderness. Over the years 1985–2006 it was not noticed in the Park by L. and G. Chandler, N. Reeve or THF (Freed 2006*a*).

At Blackheath, in the late 1940s and up to about 1956, the wall butterfly was quite often seen at the bomb-sites, such as the one adjacent to the Prince of Wales Pond. In 1966–1970, A. A. Allen (1967, 1969*b*, 1970*a*, *b*) thought that it was gradually increasing at Blackheath. Later he reversed his opinion, informing Chalmers-Hunt (1960–81) that he had hardly seen it there, or not at all, since 1970. He confirmed this in Allen (1997), stating that, although previously not uncommon, he had not seen the species for several years.

Hipparchia semele (Linnaeus) GRAYLING

On 28 August 1947, JFB captured a male in good condition flying low over grassland on Blackheath close to the south wall of Greenwich Park. Chalmers-Hunt (1960–81) incorrectly gave the date as 26 August 1947. The grayling had shown signs of expansion in north-west Kent in the hot summer of 1947 and this one had perhaps wandered from Sundridge Park, about 5.5 km to the south, where imagines had appeared for the first time that year (Burton 1995)

Pyronia tithonus (Linnaeus) GATEKEEPER

Fenn, then residing in Lewisham, wrote that the gatekeeper (also known as the hedge brown) was 'formerly one of the most abundant of our butterflies, swarming along our hedges, and occurring commonly in gardens and many other places; it began to disappear about 1878, and is now quite extinct'. Edwards, however, included it in his list of Greenwich Park butterflies in Webster, but without comment, so his records may have been very old ones. West also listed it, giving Blackheath among the localities he mentioned, and Tutt (1907) repeated them in Grinling without suggesting that the gatekeeper had disappeared from them at that date. It apparently remained locally common on the outskirts of London, such as at Dartford Heath and Bexley, and Hayes and Keston Commons, and this was still the case when JFB, K. H. Hyatt and D. F. Owen visited these localities in the late 1940s. They never encountered it closer to London.

Around 1947, the gatekeeper began to recolonize former territory: it appeared in good numbers at Elmstead Wood and Sundridge Park, near Bromley, where it had previously been absent (Burton 1995) and clearly continued this expansion, if fitfully, because it arrived at Shooters Hill in 1990 and on Woolwich Common in 1991 (Allen 1991, 1992, Burton 1992). By 1996 it had extended its range farther west to Charlton, just to the east of Blackheath, and Allen (1997) reported that 'in just one season it has become common in apparently all suitable places'. By 2001 it had obviously spread through Blackheath to colonize Greenwich Park because it was recorded there by L. and G. Chandler (Freed 2006*a*). In 2003 its presence in the Park was noted by N. Reeve, while THF stated that it 'featured well' on the butterfly transect walks at Crooms Hill and around One Tree Hill in 2004–2006.

Maniola jurtina (Linnaeus) MEADOW BROWN

Tutt, summarizing information in 1907 for Grinling, stated that the meadow brown was formerly abundant in Westcombe Park (presumably before it was built over) and that it was common at Blackheath. Earlier, Edwards included it on the list of Greenwich Park butterflies he supplied to Webster. Owen and Owen (1950) in their account of the Park's butterflies stated that it was 'generally common, but that numbers were kept down by the cutting of the grass in most of the breeding areas'. As they pointed out, during the war the grass on the adjacent parts of Blackheath was allowed to grow long and therefore there was a considerable increase in the meadow brown population, which resulted in more being seen in Greenwich Park. From 1946 to 1951 JFB saw the species in considerable numbers in the Wilderness, the Superintendent's Paddock and in the Flower Gardens of the Park, as well as on adjacents parts of Blackheath. In July 1947 he also found many flying in the large garden of a bombed house in Mycenae Road at Blackheath. On later visits to Blackheath, 30 August 1983 (with D.F. Owen) and 30 June 1989, he met with several in the Vanbrugh Pits area. At Blackheath Park, Allen (1967) reported that *jurtina* continued to flourish and stated (Allen 1978) that he saw many flying in a large rough, fallow field and nectaring at thistle flowers on 30 July 1977. In 1992, Roper (1992) mentioned the existence of ' a flourishing colony' on a tiny linear meadow — a small area of rough grass and bushes — alongside the up platform at Greenwich Station, a few streets away from the north-west corner of Greenwich Park, and almost entirely surrounded by houses and industrial estates. Apparently, the meadow brown is still present in good numbers in the Park, because THF (2006*a*) commented that it 'featured well' on the butterfly transect walks at Crooms Hill and around One Tree Hill in 2004–2006. Prior to that, it was also reported in the Park by L. and G. Chandler in 1985–2001, and by N. Reeve in 2003 (Freed 2006*a*).

Coenonympha pamphilus (Linnaeus) SMALL HEATH
Described by Tutt in Grinling as common and generally distributed in 1907, including Blackheath, where it used to be plentiful, as well as in Greenwich Park (where it was recorded by Stanley Edwards in 1902) in the late 1940s and into the early 1950s at least. The only report we know of it in either place since then is Allen's (1967) statement that it appeared in his garden at Blackheath Park only as a stray. His last record dates from 11 July 1970 (Allen 1970*b*). Certainly, THF (2006*a*) had no records of it over the period 1985–2006. Owen and Owen (1950) stated that the small heath's distribution and relative abundance in Greenwich Park was similar to that of the meadow brown. In the years 1946 to 1951 JFB saw many in the Wilderness and the Superintendent's Paddock in the Park, to which it was largely confined, and also in small numbers on Blackheath proper, including the adjacent bomb-sites.

Moths (Macrolepidoptera)

LASIOCAMPIDAE

Poecilocampa populi (Linnaeus) DECEMBER MOTH
Included by Stanley Edwards in his list of Greenwich Park moths supplied to Webster. No other records.

Trichiura crataegi (Linnaeus) PALE EGGAR
West reported taking an imago at rest on a wall at Blackheath. No records since then (Chalmers-Hunt 1960–81, Plant 1993).

[*Eriogaster lanestris* (Linnaeus) **Nb** SMALL EGGAR
Although not specifically reported from Greenwich Park or Blackheath, West reported finding larvae on thorn bushes at nearby Kidbrooke.]

Malacosoma neustria (Linnaeus) LACKEY
Included by Edwards in his Greenwich Park list (Webster 1902), this species was described as generally distributed in Grinling with Blackheath, Westcombe Park and Greenwich being specifically mentioned. Much more recently, the distribution map in Plant (1993) indicates its continued presence in this area in the period 1980–1991, and THF recorded one at m.v. light at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

Lasiocampa quercus (Linnaeus) OAK EGGAR
Reported by Tutt in Grinling to be generally distributed in 1907, occurring then at 'Westcombe Park, etc.' West reported finding larvae at nearby Kidbrooke. No later records.

Euthrix potatoria (Linnaeus) DRINKER
Included by Edwards in his Greenwich Park list in Webster, while West reported that the larvae were common on grass in Kidbrooke Lane. No later records.

[*Gastropacha quercifolia* (Linnaeus) LAPPET
West bred imagines from larvae collected from blackthorn at Kidbrooke, near Blackheath.]

DREPANIDAE

Falcaria lacertinaria (Linnaeus) SCALLOPED HOOK-TIP
Included by Edwards in his Greenwich Park list in Webster. No later records.

Watsonalla binaria (Hufnagel) OAK HOOK-TIP
THF (2006*a*) recorded the following at m.v. light in Greenwich Park: one in the Bird Sanctuary on 22 July 2004 and two there on 4 September 2004, plus singles at the Observatory on 4 September 2004 and 12 August 2005.

Watsonalla cultraria (Fabricius) **L** BARRED HOOK-TIP
An imago JFB caught in the Wilderness in Greenwich Park on 10 August 1953 is the only record of the species in this area of which we are aware. As there are some fine beeches in the Park it is possible that this moth bred there.

Drepana falcataria (Linnaeus) **L** PEBBLE HOOK-TIP
Included by Edwards in his Greenwich Park list in Webster. No other records.

Cilix glaucata (Scopoli) CHINESE CHARACTER
Also included by Edwards in his Greenwich Park list. Recorded at Blackheath in the 1960s and '70s by A. A. Allen who found the larvae on bramble as well as on hawthorn (Chalmers-Hunt 1960–81). No other records.

Thyatira batis (Linnaeus) PEACH BLOSSOM
Included by Edwards in his Greenwich Park list (Webster 1902) and reported by Tutt in Grinling to occur at 'Westcombe Park, etc.' No later records.

Habrosyne pyritoides (Hufnagel) BUFF ARCHES
Included by Edwards in his Greenwich Park list (Webster 1902) and reported by Tutt in Grinling to be generally distributed and 'sometimes common' throughout the SE London area, including Westcombe Park and, per Robert Adkin, in Greenwich Park. On 26 June 1947, D.F. Owen caught a female at a bomb-site on the southern (Lewisham) side of Blackheath. No other records since then.

Tethea ocularis (Linnaeus) FIGURE OF EIGHTY
Edwards, Tutt and West made no mention of this species in this area, but on 5 June 1947 D.F. Owen found a female at rest on an elm in Greenwich Park. In 1959, A.A. Allen reported that it was 'not rare' at light at Blackheath (Chalmers-Hunt 1960–81). No other records since then.

Cymatophorima diluta (Denis & Schiffermüller) **L** OAK LUTESTRING
This species was listed for Greenwich Park in Webster. No other reports.

GEOMETRIDAE

Alsophila aescularia (Denis & Schiffermüller) MARCH MOTH
In Grinling this species is described as generally distributed and was specifically recorded from Westcombe Park and Blackheath by Tutt and West, and from Greenwich Park by A. H. Jones. Edwards also included it in his Greenwich Park list in Webster. It still occurred in the district in the 1940s as D. F. Owen and JFB saw five on trees in Greenwich Park on 17 March 1947 and one there the following day, while at Blackheath a male was found by Owen at rest on a horse chestnut tree on 28 February 1948 and two males at rest on the same tree on 4 March 1948 (pers.comm.). No later reports.

Pseudoterpna pruinata (Hufnagel) GRASS EMERALD
West used to find the larvae of this moth on broom and gorse at Blackheath. Not recorded since.

Comibaena bajularia (Denis & Schiffermüller) **L** BLOTCHED EMERALD
An imago recorded by A. A. Allen at Blackheath in 1960 (Chalmers-Hunt 1960–81) is the only record known to us from this area.

Hemithea aestivaria (Hübner) COMMON EMERALD
Tutt in Grinling stated that the Common Emerald was local in the SE London area. Edwards included it in his Greenwich Park list in Webster, but since then the only records of which we are aware are: a female caught by D.F. Owen (pers.comm.) on a bomb-site on the Lewisham side of Blackheath on 26 June 1947 and the following recorded by THF at m.v. light in Greenwich Park: four in the Bird Sanctuary on 23 June 2005; one at the Observatory on 23 June 2005 and two there on 6 July 2004.

Hemistola chrysoprasaria (Esper) **L** SMALL EMERALD
The only records of which we are aware are of one found by D.F. Owen (pers. comm.) at rest on a willow at Blackheath on 5 June 1947 and one recorded by THF at m.v. light in Greenwich Park's Bird Sanctuary on 23 June 2005.

Jodis lactearia (Linnaeus) LITTLE EMERALD
Described in Grinling as 'generally distributed', West reported that it occurred at Greenwich and many other places, but did not specifically mention Greenwich Park or Blackheath. However, Edwards included it in his Greenwich Park list in Webster. We know of no more recent reports.

Cyclophora pendularia (Clerck) **RDB3** DINGY MOCHA
This species is now long extinct in the London Area, but was reported from Blackheath in the past (*Victoria County History of Kent* 1908, de Worms 1953–58, Plant 1993).

Cyclophora porata (Linnaeus) **Nb** FALSE MOCHA
In Grinling it is stated that Fenn found this species at Blackheath; he himself, Fenn, reported that it was almost extinct, although it used to be abundant. No later reports.

Cyclophora punctaria (Linnaeus) **L** MAIDEN'S BLUSH
THF recorded two at m.v. light in Greenwich Park's Bird Sanctuary on 17 May 2004 and one on 7 June 2004. No earlier reports.

Timandra comae (Schmidt) BLOOD-VEIN
JFB and D. F. Owen found a very worn imago in Greenwich Park on 2 June 1949. Much more recently THF recorded the following at m.v. light in the Park: one in the Bird Sanctuary on 17 May and 7 June, four there on 22 July and three on 4 September, and two at the Observatory on 22 July, all in 2004.

Scopula marginepunctata (Goeze) **L** MULLEIN WAVE
Reported by Tutt in 1907 in Grinling to be generally distributed throughout the SE London area; he mentioned 'Charlton, Lewisham, etc.', but not Blackheath or Greenwich Park. However, in 1953 A. J. Showler found the species at Blackheath, where A.A. Allen (Chalmers-Hunt 1960–81) reported it to be rare at street lamps. The latter obtained one from a fence on 26 August 1955 and another in his garden on 4 September 1956, and stated that in 1960, at m.v. light, it was more common. No later records.

*Scopula imitaria (*Hübner) SMALL BLOOD-VEIN
Included by Edwards in his Greenwich Park list in Webster, but not specifically reported from Blackheath or Greenwich in Grinling, although nearby Kidbrooke is listed. No recent records known.

Idaea rusticata (Denis & Schiffermüller) **L** LEAST CARPET
Reported by A. J. Showler to have been abundant at Blackheath in 1962–63 (de Worms 1963). In Greenwich Park THF recorded the following at m.v. light: two in the Bird Sanctuary on 6 July and nine on 22 July 2004, plus two there on 11 October 2005 and one at the Observatory on 22 July 2004. No earlier reports than that of Showler.

Idaea biselata (Hufnagel) SMALL FAN-FOOTED WAVE
Described by Tutt in 1907 in Grinling as generally distributed, occurring at Westcombe Park, Blackheath, etc., and included by Edwards in his Greenwich Park list in Webster. We know of no more recent records.

Idaea fuscovenosa (Goeze) **L** DWARF CREAM WAVE
THF recorded the following at m.v. light in Greenwich Park's Bird Sanctuary: one on 6 July and two on 22 July 2004, and two on 23 June 2005. No earlier records.

Idaea seriata (Schrank) SMALL DUSTY WAVE
Described by Tutt in 1907 in Grinling as 'common throughout, and in a quite suffused form in the metropolitan area. — Westcombe Park, Blackheath, Lewisham, etc.' In 1908, commenting upon the discvery of the larva on ivy in Staffordshire, Tutt (*Ent. Rec. J. Var.* **20**: 65), stated that at Westcombe Park, the moth was very abundant 'on a fence overhung with ivy, which we have long assumed to be its foodplant'. On 21 July 1888 an example of the aberration *canteneraria* (Boisduval), now in London's Natural History Museum, was reported at Blackheath (Chalmers-Hunt 1960–81, Plant 1993). The small dusty wave was included by Edwards in his Greenwich Park list in Webster. K. H. Hyatt collected specimens at Blackheath in the summers of 1952 and 1953. THF recorded one at m.v. light at the Observatory on 17 May 2004 and another at the Bird Sanctuary site on 4 September 2004.

Idaea dimidiata (Hufnagel) SINGLE-DOTTED WAVE
Described by Tutt in 1907 in Grinling as generally distributed, occurring at Westcombe Park, Blackheath, etc., and included by Edwards in his Greenwich Park list in Webster. K. H. Hyatt collected a specimen in his Blackheath house on 22 July 1958. On 23 June 2005 THF recorded one at m.v. light in Greenwich Park's Bird Sanctuary.

Idaea subsericeata (Haworth) SATIN WAVE
THF recorded one at m.v. light at the Observatory in Greenwich Park on 12 August 2005. No earlier reports known.

Idaea trigeminata (Haworth) **L** TREBLE BROWN SPOT
A. A. Allen (Chalmers-Hunt 1960–81) reported in 1959 that this moth occurred at Blackheath on waste ground and at street lamps, but was not common and was very rare at m.v. light. However, much more recently, THF recorded the following at m.v. light in Greenwich Park: 11 on 7 June and one on 6 July 2004; 15 on 23 June 2005. No reports known earlier than 1959.

Idaea aversata (Linnaeus) RIBAND WAVE
Described by Tutt in 1907 in Grinling as 'common throughout. — Westcombe Park, Blackheath, Lewisham, etc.' Edwards included it in his Greenwich Park list in Webster.

Recently THF took the following at m.v. light in Greenwich Park: Bird Sanctuary: two on 7 June, five on 6 July and forty-eight on 22 July 2004; nineteen on 23 June and six on 12 August 2005; Observatory: four on 6 July 2004 and one on 12 August 2005. Chalmers-Hunt (1960–81) reported that A.A. Allen presented him with a single male of the aberration *suffumata* Lambillion which he had captured at Blackheath on 26 July 1967.

Rhodometra sacraria (Linnaeus) VESTAL
K. H. Hyatt (pers.comm.) captured an imago of this usually rare but regular immigrant from southern Europe flying around buddleia blossoms at Blackheath on 19 September 1947, a year in which there was a very large influx. This was the moth reported by D.F. Owen and included in Plant (1986).

Orthonama obstipata (Fabricius) GEM
Recorded as attracted to lamps at Blackheath by West and mentioned by Plant (1986). No other records, although single male and female imagines were reported from nearby Charlton in June 1983 (Plant 1986).

Xanthorhoe designata (Hufnagel) FLAME CARPET
One captured by THF at m.v. light by Greenwich Park's Observatory on 12 August 2005. No earlier records.

Xanthorhoe spadicearia (Denis & Schiffermüller) RED TWIN-SPOT CARPET
Reported in Grinling to have occurred at Westcombe Park, Blackheath, etc. (J.W. Tutt) and at Greenwich (R. Adkin). No later records known.

Xanthorhoe ferrugata (Clerck) DARK-BARRED TWIN-SPOT CARPET
Listed for Westcombe Park, etc. by Tutt in Grinling. No other records known.

Xanthorhoe montanata (Denis & Schiffermüller) SILVER-GROUND CARPET
Described in Grinling as generally distributed in the SE London area. D. F. Owen (pers.comm.) found singletons at Blackheath on 9 June 1947 and in Greenwich Park on 13 May 1950. The latter was at rest on the trunk of a sweet chestnut. Not reported since.

Xanthorhoe fluctuata (Linnaeus) GARDEN CARPET
Listed for Greenwich Park by Edwards (Webster 1902) and described in Grinling as abundant throughout the SE London area, the garden carpet was still plentiful at Blackheath and in Greenwich Park in 1946–1950, D.F. Owen and JFB finding it at both places in that period. THF recorded the following at m.v. light in the Park: Bird Sanctuary: one on 22 July and 4 September, and on 23 June 2005; Observatory: three on 22 July 2004.

Scotopteryx chenopodiata (Linnaeus) SHADED BROAD-BAR
Included by Edwards in his Greenwich Park list. No other records.

[*Epirrhoe tristata* (Linnaeus) SMALL ARGENT AND SABLE
Included by Edwards in his Greenwich Park list in Webster but the record would appear to be an unlikely one although it was stated in Grinling to have been found uncommonly at Farnborough in north-west Kent. Plant (1993) mentioned this and two other London area reports but considered them to be extremely doubtful, so we suspect that Edwards made a mistake.]

Epirrhoe alternata Müller COMMON CARPET
Described in Grinling as 'generally distributed and common' without specifically mentioning Blackheath or Greenwich Park. JFB and D.F. Owen occasionally came across imagines in both places in the late 1940s. On 12 August 2005, THF caught one at m.v. light in Greenwich Park's Bird Sanctuary

Camptogramma bilineata (Linnaeus) YELLOW SHELL
Included by Edwards in his Greenwich Park list (Webster 1902) and described in Grinling as 'generally distributed and abundant' in the early 1900s, JFB and D.F. Owen found it still so in 1947 at Blackheath. Their only record for Greenwich Park, however, was of one on 10 June 1949. Recently, on 22 July 2004, THF saw two in the daytime on One Tree Hill in the Park and trapped two at m.v. light in the Bird Sanctuary on the same date and another on 12 August 2005. Chalmers-Hunt (1960–81) reported the finding of ab. *brunneata* Kautz at Westcombe Park in 1893.

Anticlea badiata (Denis & Schiffermüller) SHOULDER STRIPE
Listed for Greenwich Park by Edwards. No other records.

Pelurga comitata (Linnaeus) DARK SPINACH
Listed for Greenwich Park by Edwards (Webster 1902) and reported in Grinling from the nearby districts of Lewisham and Greenwich Marshes. In the 1950s and '60s, A.A. Allen reported it to be 'not uncommon' in his garden and at light in Blackheath Park (Chalmers-Hunt 1960–81). K. H. Hyatt collected a specimen at Blackheath on 16 July 1952. No later records.

Eulithis testata (Linnaeus) CHEVRON
Not reported from Blackheath or Greenwich Park in Grinling. However, on 29 August 1951 D.F. Owen (pers.comm.) caught one at dusk on a bomb-site near the Hare and Billet Pond at Blackheath. No later records.

Eulithis mellinata (Fabricius) SPINACH
Reported from Blackheath by West and from Westcombe Park by Tutt in Grinling. The inclusion by Edwards of the northern spinach *E. populata* (Linnaeus) in his Greenwich Park list (Webster 1902) may have been a case of mistaken identity with the present species. No later reports.

Eulithis pyraliata (Denis & Schiffermüller) BARRED STRAW
Included by Edwards in his Greenwich Park list in Webster and described by Tutt in 1907 in Grinling as 'generally distributed —Westcombe Park, Blackheath, etc.' No later records.

Ecliptopera silaceata (Denis & Schiffermüller) SMALL PHOENIX
Described in Grinling as local in the SE London area, with no specific mention of its occurrence at Blackheath or Greenwich. JFB found one at Charlton on 26 May 1946, just east of Blackheath.

Chloroclysta siterata (Hufnagel) RED-GREEN CARPET
Recorded by THF at m.v. light by the Observatory in Greenwich Park on 11 October 2005. No earlier records.

Chloroclysta truncata (Hufnagel) COMMON MARBLED CARPET
Stated by Allen (1970*b*) to be common at m.v. light at Blackheath Park. On 18 September 1970 he obtained an imago which emerged from a pupa he found in his garden at the roots of clover. K. H. Hyatt had collected a specimen at light at Blackheath on 26 September 1956. Recorded by THF at m.v. light in Greenwich Park as follows: Bird Sanctuary: two on 7 June 2004, one on 23 June and three on 11 October 2005; Observatory: one on 23 June and another on 11 October 2005.

Cidaria fulvata (Forster) BARRED YELLOW
Included by Edwards in his Greenwich Park list in Webster and reported by Tutt in 1907 in Grinling to occur at Blackheath and Westcombe Park. No later reports.

Plemyria rubiginata (Denis & Schiffermüller) **L** BLUE-BORDERED CARPET
On 23 June 2005, THF caught three at m.v. light in Greenwich Park's Bird Sanctuary. No earlier records.

Thera obeliscata (Hübner) GREY PINE CARPET
K. H. Hyatt collected a specimen in Greenwich Park on 3 June 1947. Allen (1965) considered this species to be more or less common at Blackheath. At Greenwich Park's Bird Sanctuary, THF recorded at m.v. light one on 7 June 2004, two on 23 June and one on 11 October 2005.

Thera britannica (Turner) SPRUCE CARPET
Listed for Greenwich Park by Edwards (Webster 1902). No other records.

Hydriomena furcata (Thunberg) JULY HIGHFLYER
Included by Edwards in his Greenwich Park list but the Blackheath and Greenwich districts are not specifically mentioned in Grinling, although the species is described as generally distributed, and the adjacent districts of Kidbrooke and Lewisham are mentioned. No other records.

Hydriomena impluviata (Denis & Schiffermüller) MAY HIGHFLYER
Reported by West on fences near alders at Blackheath. At Blackheath Park, A. A. Allen reported it to be 'rare and very local' at street gas lamps in the 1950s. He twice captured imagines: one on 6 June and another on 21 June 1955 (Chalmers-Hunt 1960–81). No later records.

Horisme tersata (Denis & Schiffermüller) FERN
Included by Edwards in his Greenwich Park list in Webster and reported by Tutt in 1907 in Grinling as occurring at Blackheath. K. H. Hyatt caught a specimen in his Blackheath house on 10 July 1958, whilst A. A. Allen (Chalmers-Hunt 1960–81) reported it to be rare at street lamps and m.v. light in 1959. No later records.

Rheumaptera cervinalis (Scopoli) **L** SCARCE TISSUE
Edwards included this species in his Greenwich Park list (Webster 1902) and West reported it to be very common on fences under *Berberis* spp. bushes at Blackheath Park. He stated that he bred 'numbers very easily from the egg.' The only later record is one caught by A.A. Allen in early May 1955 flying after dusk in his garden at Blackheath Park where bushes of *Berberis spinosa* were present (Chalmers-Hunt 1960–81).

Triphosia dubitata (Linnaeus) **L** TISSUE
Reported from Blackheath and Westcombe Park by Tutt in Grinling. West mentioned finding it on fences and at lamps at Blackheath. No later records.

Epirrita dilutata (Denis & Schiffermüller) NOVEMBER MOTH
Listed for Greenwich Park by Edwards in 1902 and described in 1907 as 'generally distributed and common' by Tutt in Grinling, being specifically reported from Westcombe Park and Blackheath. It was still quite numerous in the late 1940s. On 11 October 2005, THF captured one at m.v. light in Greenwich Park's Bird Sanctuary, the only recent record.

Operophtera brumata (Linnaeus) WINTER MOTH
Included by Edwards in his Greenwich Park list in Webster and described in Grinling as abundant throughout, it was still so in the late 1940s and early 1950s. JFB has, for example, notes of the larvae being abundant on the oaks and other trees in the Wilderness in Greenwich Park in May and June 1951 and 1952. The latest report of which we are aware is of a male found by Roper (1992) inside the back door of the National Maritime Museum adjacent to the Park on 19 December 1991.

Perizoma albulata (Denis & Schiffermüller) **L** GRASS RIVULET
This species was not recorded from the Blackheath or Greenwich districts in Grinling, but two were caught by THF at m.v. light in the Bird Sanctuary, Greenwich Park on 7 June 2004.

Perizoma flavofasciata (Thunberg) SANDY CARPET
Described by A. A. Allen (Chalmers-Hunt 1960–81) as 'fairly rare at street lamps' at Blackheath in 1955. No other reports.

Eupithecia tenuiata (Hübner) SLENDER PUG
The only records are of singletons at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004 and 23 June 2005 (THF).

Eupithecia haworthiata Doubleday **L** HAWORTH'S PUG
Reported by Tutt in 1907 in Grinling to be common in gardens at Westcombe Park. In 1959, A.A. Allen recorded several at m.v. light at Blackheath Park (Chalmers-Hunt 1960–81). No later records.

Eupithecia linariata (Denis & Schiffermüller) TOADFLAX PUG
Fenn listed this species in Grinling as occurring where toadflax grows at Blackheath. No later records.

Eupithecia pulchellata (Stephens) FOXGLOVE PUG
In his diary, A. R. Kidner noted capturing an imago at Blackheath on 9 September 1907, possibly a second-generation specimen (Chalmers-Hunt 1960–81). No other reports.

Eupithecia exiguata (Hübner) MOTTLED PUG
Listed for Blackheath by Tutt in Grinling, but described by Fenn as once 'very abundant everywhere, but now scarce and local'. Chalmers-Hunt (1960–81) reported that an entry in Fenn's diary for 4 June 1861 stated that it was 'very common' at Blackheath Park. Recently, THF recorded two at m.v. light in the Bird Sanctuary, Greenwich Park on 7 June 2004. He also found a larva in the Park's Wilderness on 12 October 2006.

Eupithecia centaureata (Denis & Schiffermüller) LIME-SPECK PUG
Stated by Tutt in 1907 in Grinling to occur at Blackheath, Greenwich and Westcombe Park. Chalmers-Hunt (1960–81) states that an aberrant specimen in the Rothschild-Cockayne-Kettlewell Collection captured at Greenwich in September 1890 has the 'median shade developed', and also that an example of ab. *obscura* Dietze was taken at Lewisham in 1901. Much more recently THF recorded the following at m.v. light in Greenwich Park's Bird Sanctuary: three on 7 June 2004 and one on 23 July 2005.

Eupithecia intricata ssp. *arceuthata* (Freyer) FREYER'S PUG
THF recorded four at m.v. light in Greenwich Park's Bird Sanctuary on 7 June and two on 6 July 2004. No earlier records.

Eupithecia assimilata Doubleday CURRANT PUG
Listed in Grinling for Blackheath (Fenn), Greenwich (West) and Westcombe Park (Tutt), and also for Greenwich Park by Edwards in Webster. No other reports other than the statement in Chalmers-Hunt (1960–81) that A. A. Allen, referring to the 1950s–'60s, described it as 'apparently rare' at Blackheath.

Eupithecia vulgata (Haworth) COMMON PUG
Described in Grinling as 'abundant throughout', but Fenn declared that, although formerly a pest, it had become far from abundant. Listed for Greenwich Park by Edwards in Webster. Since then, K. H. Hyatt caught a specimen at light at Blackheath on 7 June 1958, whilst more recently THF recorded the following at m.v. light in the Park: three in the Bird Sanctuary on 17 May 2004 and three again on 7 June 2004, plus one on 23 June 2005; two at the Observatory on 17 May 2004.

Eupithecia tripunctaria Herrich-Schäffer **L** WHITE-SPOTTED PUG
One recorded at m.v. light on 17 May 2004 at the Observatory in Greenwich Park by THF is the only record.

Eupithecia subfuscata (Haworth) GREY PUG
Included by Edwards in his Greenwich Park list in Webster and listed for Blackheath and Westcombe Park by Tutt for 1907 in Grinling. No other records.

Eupithecia icterata ssp. *subfulvata* (Haworth) TAWNY SPECKLED PUG
A. A. Allen (Chalmers-Hunt 1960–81) recorded this moth visiting mint flowers at night and at m.v. light in his garden at Blackheath Park in 1959. One imago was recorded by THF at m.v. light on 6 July 2004 in the Bird Sanctuary in Greenwich Park.

Eupithecia succenturiata (Linnaeus) BORDERED PUG
Reported by A. A. Allen (Chalmers-Hunt 1960–81) at m.v. light and around street lamps at Blackheath in 1959. No other records.

Eupithecia simpliciata (Haworth) **L** PLAIN PUG
Reported by Fenn from the Lee and Blackheath districts in July 1861 (Chalmers-Hunt 1960–81) and by Tutt in Grinling from Westcombe Park. The only report of the species since then is A.A. Allen's capture of two at m.v. light at Blackheath in 1959 (Chalmers-Hunt 1960–81).

Eupithecia innotata f. *fraxinata* Crewe ASH PUG
A.A. Allen recorded one at m.v. light at Blackheath in 1959 (Chalmers-Hunt 1960–81). No other reports.

Eupithecia abbreviata Stephens BRINDLED PUG
The following were recorded by THF at m.v. light in Greenwich Park, all in 2004: Bird Sanctuary: two on 12 April, 11 and 17 May; Observatory: one on 12 April and two on 17 May. No earlier reports.

Eupithecia dodoneata Guenée OAK-TREE PUG
Recorded at m.v. light in Greenwich Park by THF as follows: Bird Sanctuary: one on 17 May and again on 7 June 2004, and two on 23 June 2005, on which latter date two were recorded at the Observatory. No earlier reports.

Eupithecia pusillata (Denis & Schiffermüller) JUNIPER PUG
Fenn stated in his diary that the juniper pug used to 'abound on all the palings round gardens' and at street lamps at Blackheath Park between 1861 and 1865. No records since then.

Chloroclystis rectangulata (Linnaeus) GREEN PUG
Included by Edwards in his Greenwich Park list for Webster and reported from Blackheath and Westcombe Park by Tutt in Grinling. Single specimens collected at Blackheath by K. H. Hyatt on 5 June 1952 and 21 June and 22 July 1958. Recorded at m.v. light in Greenwich Park by THF as follows: five on 7 June 2004 and seven on 23 June 2005.

Gymnoscelis rufifasciata (Haworth) DOUBLE-STRIPED PUG
Included by Edwards in his Greenwich Park list for Webster and reported by Tutt in Grinling as occurring at Westcombe Park. K. H. Hyatt collected single specimens at Blackheath on 9 July and 26 August 1952. Since then recorded at m.v. light in

Greenwich Park by THF as follows: seven on 17 May, one on 7 June, two on 6 July, and five on 22 July 2004; three on 23 June, and four on 12 August 2005.

Aplocera plagiata (Linnaeus) TREBLE-BAR
Listed for Greenwich Park by Edwards in Webster. No other reports.

Odezia atrata (Linnaeus) CHIMNEY SWEEPER
Listed in Grinling as rare and reported there by Robert Adkin from Lewisham and Greenwich, but neither Blackheath nor Greenwich Park specifically mentioned. Not listed by Edwards in Webster. Now thought to be extinct in the Kentish part of the London Area as the last report of its occurrence was in 1939 (Plant 1993).

Euchoeca nebulata (Scopoli) **L** DINGY SHELL
One caught by A. A. Allen at m.v. light in 1959 at Blackheath (Chalmers-Hunt 1960–81) is the only record.

Abraxas grossulariata (Linnaeus) MAGPIE
Described by Tutt in Grinling as abundant throughout the SE London area and included by Edwards in his Greenwich Park list in Webster. By the 1940s it had become scarce in the area surveyed by this paper. JFB's only records are of two at dusk on the Lewisham side of Blackheath on 1 August 1946; one at nearby Kidbrooke on 25 June 1947; a female, which laid several eggs, at Westcombe Park on 24 June 1948; and one flying along a privet hedge near the Royal Naval College on the early date of 3 June 1959. No later records.

Ligdia adustata (Denis & Schiffermüller) **L** SCORCHED CARPET
One recorded by THF at m.v. light in Greenwich Park's Bird Sanctuary on 7 June 2004 is the only record.

Macaria liturata (Clerck) TAWNY-BARRED ANGLE
The only records are of single moths captured at Blackheath by A. A. Allen on 21 June and 2 August 1960 (Chalmers-Hunt 1960–81, Allen 1965) and, much more recently, one recorded by THF at m.v. light in Greenwich Park's Bird Sanctuary on 7 June 2004.

Macaria wauaria (Linnaeus) **L** V-MOTH
Listed for Greenwich Park by Edwards in Webster, and from Blackheath, Westcombe Park, Greenwich and Lewisham in Grinling, where it is described as common in gardens. West reported finding the larvae on currant and gooseberry at Greenwich. At Blackheath in the 1950s, A. A. Allen (Chalmers-Hunt 1960–81) rated the imagines as 'not very common at m.v. light' in his garden. No more-recent reports.

Chiasmia clathrata (Linnaeus) LATTICED HEATH
One recorded by THF at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004.

Petrophora chlorosata (Scopoli) BROWN SILVER-LINE
Recorded in Greenwich Park by Edwards (Webster 1902), presumably in the area of the Wilderness where bracken once grew extensively. Here, in the adjacent Bird Sanctuary site, THF captured one on 7 June 2004 and two on 23 June 2005; one was also taken at the Observatory on the latter date.

Plagodis pulveraria (Linnaeus) **L** BARRED UMBER
Nowadays considered extremely local and possibly extinct in the London Area (Plant 1993), it was included by Edwards in his Greenwich Park list in 1902. Up to about that time it occurred nearby at Shooters Hill but was gradually becoming scarcer (Fenn 1895). No other records.

Opisthograptis luteolata (Linnaeus) BRIMSTONE MOTH
Listed for Greenwich Park by Edwards in Webster and from Blackheath, Greenwich, Westcombe Park and Lewisham, etc. in Grinling where it is described as abundant throughout the SE London area. It was still quite plentiful in these districts in the 1940s and early 1950s. Recently, THF recorded it at m.v. light in Greenwich Park: two on 17 May, and two on 7 June 2004; one on 23 June, and six on 12 August 2005.

Epione repandaria (Hufnagel) BORDERED BEAUTY
Reported by Tutt in Grinling to occur at that time in Greenwich Marshes, it appears in Edwards's Greenwich Park list in Webster. No later reports.

Ennomos quercinaria (Hufnagel) **L** AUGUST THORN
Described by Tutt in 1907 (Grinling) as generally distributed in gardens and woods, and listed by him from Blackheath and Westcombe Park, it was not included by Edwards in

his Greenwich Park list in Webster. The only more-recent records are of A.A. Allen's report of an imago at Blackheath in 1960 (Chalmers-Hunt 1960–81) and THF's capture of another at m.v. light on 22 July 2004 in the Bird Sanctuary in Greenwich Park.

Ennomos alniaria (Linnaeus) CANARY-SHOULDERED THORN
In Grinling this species was reported from Blackheath, Westcombe Park and Greenwich, and included by Edwards in his Greenwich Park list in Webster. On 5 September 1947 JFB found one on the trunk of a willow beside the Hare and Billet Pond at Blackheath, close to the perimeter wall of Greenwich Park, and, on 21 September 1951, D.F. Owen (pers.comm.) found a freshly emerged female on a willow trunk in precisely the same location. No reports since.

Ennomos fuscantaria (Haworth) DUSKY THORN
Reported in Grinling to have occurred at Blackheath, Westcombe Park and in Greenwich Park. A.A. Allen (Chalmers-Hunt 1960–81) stated that in the 1950s this was 'much the commonest of the genus at light' at Blackheath. No records since then.

Ennomos erosaria (Denis & Schiffermüller) SEPTEMBER THORN
Reported from Blackheath by J.W. Tutt in Buckell and Prout (1898–1901). No subsequent records.

Selenia lunularia (Hübner) **L** LUNAR THORN
Listed for Greenwich Park by Edwards in Webster, but no records were included for the present area in Grinling, where it is described as 'distributed but scarce'. No other records.

Odontopera bidentata (Clerck) SCALLOPED HAZEL
Included by Edwards in his Greenwich Park list in Webster but no records in Grinling. Chalmers-Hunt (1960–81) reported that A. A. Allen caught a moth of the intermediate form of ab. *nigra* Prout at Blackheath in 1955. No other records.

Crocallis elinguaria (Linnaeus) SCALLOPED OAK
Reported by Tutt in Grinling from Westcombe Park and listed for Greenwich Park by Edwards in Webster. In 2004, THF recorded singles at m.v. light on 6 and 22 July in Greenwich Park's Bird Sanctuary.

Ourapteryx sambucaria (Linnaeus) SWALLOW-TAILED MOTH
Described in Grinling as abundant throughout the SE London area, particularly in suburban gardens, and specifically reported from Blackheath, Westcombe Park and Greenwich, and also included by Edwards in his Greenwich Park list in Webster. A specimen of ab. *delineata* Lempke bred by Tutt from a larva obtained at Westcombe Park in 1885 is in the Rothschild-Cockayne-Kettlewell Collection. The only more recent reports of which we are aware are of one JFB caught on a bomb-site on the Lewisham side of Blackheath on 1 August 1946 and a female caught by D.F. Owen (pers.comm.) in the same place on 26 June 1947, which laid twenty eggs.

Colotois pennaria (Linnaeus) FEATHERED THORN
Included by Edwards in his Greenwich Park list in Webster and for Blackheath by West in Grinling. No more-recent records than that, although JFB and D.F. Owen frequently encountered this moth in the nearby Shooters Hill woods in the 1940s and early 1950s (Burton 1992), as did Sokoloff (1984) in Oxleas Wood.

Phigalia pilosaria (Denis & Schiffermüller) PALE BRINDLED BEAUTY
Included by Edwards in his Greenwich Park list in Webster and specifically mentioned as occurring at Blackheath in Grinling. JFB and K.H. Hyatt found it plentiful on elm tree trunks in Greenwich Park in March 1947. Not apparently reported since then nor by THF in his 2004–2006 survey of Greenwich Park.

Lycia hirtaria (Clerck) BRINDLED BEAUTY
Included by Edwards in his Greenwich Park list in 1902 and described in 1907 by Tutt in Grinling as common on limes and in main streets at Blackheath, Westcombe Park and Greenwich. Chalmers-Hunt (1960–81) reported Stanley Edwards's mention of its occurrence at Blackheath in 1918. It was still quite numerous on the trunks of lime trees and on fences in these districts, including Greenwich Park, in the late 1940s and in the 1950s (JFB). In 1959, A.A. Allen (Chalmers-Hunt 1960–81) described it as 'not rare at m.v. light and on lime trunks' at Blackheath. Not recorded by THF in his 2004–2006 survey.

Biston strataria (Hufnagel) OAK BEAUTY
Recorded in Greenwich Park by Edwards (Webster 1902) and also by Tutt in Grinling as well as at Blackheath. JFB and D.F. Owen never found it in this district in the late 1940s, although the former did so in the nearby Shooters Hill woods (Burton 1992).

Biston betularia (Linnaeus) PEPPERED MOTH
Specifically reported in Grinling from Greenwich Park (Tutt) and Blackheath (West). It was also included by S. Edwards on his Greenwich Park list supplied to Webster. In the 1940s, when the species was still plentiful, the melanic form *carbonaria* was dominant. However, K. H. Hyatt had a fine male of the typical form emerge on 26 May 1947 from a pupa he had dug up the previous winter in Greenwich Park, and on 14 July 1949, JFB and D.F. Owen found a deformed female of this form on a tree in the Park. During May and early June 1947, JFB had many *carbonaria* emerge from pupae that he had dug up during the winter at Blackheath and in Greenwich Park. Since then, A.A. Allen (Chalmers-Hunt 1960–81) reported finding the larva on wild plum at Blackheath, presumably in the 1950s. A later record is of an imago captured by THF at m.v. light at the Observatory in Greenwich Park on 17 May 2004, and he took another at the Bird Sanctuary on 4 July 2008; both were of the typical form.

Agriopis leucophaearia (Denis & Schiffermüller) SPRING USHER
Described in Grinling as generally distributed in oakwoods, the spring usher was included by Edwards in his Greenwich Park list in Webster. The only record since then of which we are aware concerns a freshly emerged male that JFB and D.F. Owen found on an oak trunk in the Park on 19 February 1949.

Agriopis aurantiaria (Hübner) SCARCE UMBER
Reported in 1907 by Tutt in Grinling to be local, he specifically mentioned its occurrence at Blackheath and it was listed for Greenwich Park by Edwards (Webster 1902). We know of no records since then, although it still occurred at nearby Shooters Hill in the late 1940s (D.F. Owen) and in the 1980s (Sokoloff 1984), and at Charlton in 1950 (JFB).

Agriopis marginaria (Fabricius) DOTTED BORDER
Not included by Edwards in his Greenwich Park list, but reported in 1907 by Tutt from Blackheath and Lewisham in Grinling where he described it as generally distributed in hawthorn hedges. It was plentiful in the Shooters Hill woods in the late 1940s (Burton 1992) and in the 1980s (Sokoloff 1984). Apart from Allen (1969*c*) trapping imagines regularly at m.v. light in his Blackheath Park garden in the 1960s, there are no reports from more recent years in the Blackheath and Greenwich districts.

Erannis defoliaria (Clerck) MOTTLED UMBER
Included by Edwards in his Greenwich Park list in Webster and by Robert Adkin in Grinling and also in that publication for Blackheath, Lewisham and Westcombe Park by Tutt in 1907. K. H. Hyatt collected a male and a female at Blackheath on 5 December 1947 and 6 December 1952 respectively. It was still numerous in the nearby Shooters Hill woods in the late 1940s and in the 1980s (Burton 1992).

Menophra abruptaria (Thunberg) WAVED UMBER
Listed for Greenwich Park by Edwards (Webster 1902) and described by Tutt in 1907 in Grinling *as* 'generally distributed, sometimes abundant in parks and gardens' at Blackheath, Greenwich, Lewisham and Westcombe Park. The only records of which we know since then concern one which emerged on 10 May 1947 from a pupa found in Greenwich Park by K.H. Hyatt (per D.F. Owen) and the singletons JFB found at Blackheath on 4 and 27 May 1948. Chalmers-Hunt (1960–81) mentioned that an aberration with the 'whitish ground markings obsolescent' was found at Blackheath by Tutt and is in the Rothschild-Cockayne-Kettlewell Collection.

Peribatodes rhomboidaria (Denis & Schiffermüller) WILLOW BEAUTY
Listed as an inhabitant of Greenwich Park by Edwards in Webster, this moth was reported by Tutt (1907) in Grinling to be generally distributed and common in the SE London area, including Blackheath, Greenwich, Westcombe Park and Lewisham. In 1947, JFB found one on an oak in Greenwich Park on 1 August and another on a fence at Langton Way, Blackheath, on 5 August. Recently, THF recorded the species at m.v. light in Greenwich Park as follows: one on 17 May, 20 on 7 June, two on 6 July, four on 22 July, and six on 4 September 2004; 15 on 23 June, and three on 11 October 2005. Chalmers-Hunt (1960–81) listed the following aberrations in the Rothschild-Cockayne-Kettlewell Collection which were all bred in 1901from larvae found at Blackheath: ab. *perfumaria* (one), ab. *brunneata* Lempke (one) and ab. *simplicia* Lenek (one).

Alcis repandata (Linnaeus) MOTTLED BEAUTY
Reported in Greenwich Park by Edwards in Webster and at Blackheath by West in Grinling. K. H. Hyatt collected three specimens at Blackheath between July and September 1952. No later records.

Hypomecis punctinalis (Scopoli) PALE OAK BEAUTY
The only record is of one caught by THF at m.v. light in Greenwich Park's Bird Sanctuary on 7 June 2004. Burton (1992) caught a male in the nearby Shooters Hill woods in May 1948.

Ectropis bistortata (Goeze) ENGRAILED
Reported by West in Grinling from 'Blackheath, etc.'. No other records.

Ectropis crepuscularia (Denis & Schiffermüller) **L** SMALL ENGRAILED
Reported from Greenwich Park by West in Grinling but not by Edwards (Webster 1902). No other records.

Cabera pusaria (Linnaeus) COMMON WHITE WAVE
Included by Edwards in his Greenwich Park list (Webster 1902), but only mentioned as occurring at Lewisham in Grinling. In 2005, THF recorded three at m.v. light in Greenwich Park's Bird Sanctuary on 23 June.

Lomographa bimaculata (Fabricius) WHITE-PINIONED SPOTTED
On 21 June 1960, A. A. Allen (Chalmers-Hunt 1960–81) caught a worn imago at Blackheath, and THF recorded single moths at m.v. light in Greenwich Park's Bird Sanctuary on 11 May and 7 June 2004, the only reports from the area.

Lomographa temerata (Denis & Schiffermüller) CLOUDED SILVER
THF recorded the foloowing at m.v. light in Greenwich Park: one on 6 July and another on 22 July 2004, plus one on 4 July 2008.

Campaea margaritata (Linnaeus) LIGHT EMERALD
Included by Edwards in his Greenwich Park list in Webster, but the only record in the area of which we are aware of since then until THF's 2004–2006 Greenwich Park survey is an imago JFB caught at dusk on the Lewisham side of Blackheath on 1 August 1946. In the Park, THF trapped the following at m.v. light: 14 on 7 June and three on 4 September 2004; two on 23 June and four on 12 August 2005.

SPHINGIDAE

Agrius convolvuli (Linnaeus) CONVOLVULUS HAWK-MOTH
West found an imago 'at rest on the trunk of a chestnut-tree' in Greenwich Park in 1870 and Edwards included the species in his Park list in Webster, possibly on the basis of West's specimen. West also reported capturing an imago in flight at Greenwich in 1873. In Grinling the species is described as fairly frequent in some years, when immigration has taken place, and among localities where it had occurred, Blackheath (1886), Lewisham (Fenn), Greenwich (West) and Westcombe Park (Tutt) are mentioned. K. H. Hyatt collected a specimen at Blackheath on 24 August 1960. We know of no other records.

Acherontia atropos (Linnaeus) DEATH'S-HEAD HAWK-MOTH
Listed by Edwards in his Greenwich Park list in Webster, but with no supporting details. Fenn and Tutt also reported the occurrence of imagines at Lewisham and Greenwich repectively in Grinling. At nearby Kidbrooke, West bred imagines in May and October from pupae dug up in August 1866. No other records.

Sphinx ligustri (Linnaeus) PRIVET HAWK-MOTH
This hawk-moth was included by Edwards in his Greenwich Park list in Webster. West reported that the larvae were common on privet at Greenwich and Lewisham, which was also the experience of JFB, K. H. Hyatt and D. F. Owen in the late 1940s, although they were becoming harder to find from 1948. On 1 June 1947 and on 8 June 1947, JFB had, respectively, a male and a female emerge from pupae that he had collected at Blackheath the previous winter. On 20 June 1947, D. F. Owen (pers.comm.) caught a female at a bomb-site on the Lewisham side of Blackheath and JFB caught a male in flight in his garden in nearby Charlton on 8 June 1947.

Hyloicus pinastri (Linnaeus) **L** PINE HAWK-MOTH
The only record of which we are aware is of one caught by THF at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004.

Mimas tiliae (Linnaeus) LIME HAWK-MOTH
This attractive hawk-moth was included by Edwards in his Greenwich Park list in Webster, and West reported finding larvae on elms in the Park, then in 1918 he stated (Chalmers-Hunt 1960–81) that, many years previously, pupae were very common at the foot of oaks there. In 1907, Tutt found larvae on the limes in the grounds of the naval college close to the Park (Grinling). Fenn in Grinling recorded the species as common

at Blackheath, where in the late 1940s and early 1950s, JFB, K.H. Hyatt and D.F. Owen dug up many pupae from under limes, elms and willows, as well as in Greenwich Park. In 1947 Owen wrote to Chalmers-Hunt (1960–81) that the lime hawk was 'extremely abundant at Lewisham, Lee, Kidbrooke, Blackheath and Greenwich; the larvae or pupae being found on nearly every elm and lime'. He added that 'he took with ease sixty pupae from beneath trees at Lewisham and Blackheath during the winter of 1946–47'. On 24 June 1946 JFB came upon a newly emerged male on a lime trunk in the Park. The only subsequent report is of a larva found by Patricia Brown in 2005.

Smerinthus ocellata (Linnaeus) EYED HAWK-MOTH
Included by Edwards in his Greenwich Park list in Webster, this hawk-moth was also reported by Tutt in Grinling from 'Westcombe Park, Greenwich, etc.' In the winter of 1946–47, JFB, K. H. Hyatt and D. F. Owen occasionally dug up pupae under willows on Blackheath where we found larvae in 1946 and 1947. In May 1948, K. H. Hyatt had adults emerge from eggs collected at Blackheath. Owen also reported to Chalmers-Hunt (1960–81) that, in 1946, he found eyed hawk eggs to be very numerous on sallows growing on bomb-sites at Lewisham, including those in the Blackheath part of that borough. On 12 July 1947, JFB saw a house sparrow with a nearly fully grown larva it had found in a willow by the Hare and Billet Pond. On 19 August 1948, JFB and Owen found *ocellata* larvae numerous on sallows growing on the bomb-site opposite this pond at Blackheath.

Laothoe populi (Linnaeus) POPLAR HAWK-MOTH
This species appears in Edwards's Greenwich Park list in Webster and was reported by Tutt in Grinling from Blackheath, Westcombe Park and Lewisham and by West from Greenwich. At Blackheath JFB found a fully grown larva on poplar on 29 July 1947, D.F. Owen (pers.comm.) found larvae there on 12 September 1947, and a fully grown larva, ready to pupate, at the base of a willow on 26 September 1951. K. H. Hyatt had Blackheath adults emerge in April and May 1948 that he had reared from eggs. Chalmers-Hunt (1960–81) reported that West noted that males were 'frequently very rosy in tint' in the Lewisham and Greenwich districts, and D.F. Owen stated (1947) that at Lewisham decidedly pink females are not uncommon.

Macroglossum stellatarum (Linnaeus) HUMMING-BIRD HAWK-MOTH
Being an immigrant, this hawk-moth varies greatly in numbers from year to year. West stated that in July 1865 it was 'very common on Blackheath, flying around the walls and fences like so many swallows'. In Grinling it was reported from Blackheath, Westcombe Park and Lewisham, while Edwards listed it for Greenwich Park in Webster. In 1946 it occurred in small numbers in the SE London area and JFB saw singletons at buddleia at Blackheath on 10 and 11 July. In 1947 there were large influxes of migrant insects, among them many *stellatarum*: from late September to the middle of October they were especially numerous at Blackheath and in Greenwich Park. On 27 September, for example, JFB saw in the Park's Flower Gardens half a dozen at a time hovering around dahlias and other flowers; on 30 September he and K. H. Hyatt captured nine in the space of fifteen minutes. On 10 October JFB counted fifteen in the Flower Gardens and on 19 October saw the last one. In 1948 they were scarce, but there was another, much smaller influx in 1949, when K. H. Hyatt saw one in his Blackheath garden on 5 June and J. E. Owen (D.F. Owen, pers.comm.) saw one in Greenwich Park on 7 June.

Hyles livornica (Esper) STRIPED HAWK-MOTH
In 1880 West captured one of these usually scarce immigrants at rest on a machine in the workshop of John Penn & Sons in Greenwich, not far from Greenwich Park.

Deilephila elpenor (Linnaeus) ELEPHANT HAWK-MOTH
Although described in Grinling as generally distributed in the ditches of the Thames marshes from Greenwich to Erith, we are unaware of any early records of its occurrence at Blackheath or in Greenwich Park. However, D.F. Owen (pers. comm.) caught a female on a bomb-site on the Lewisham side of Blackheath on 20 June 1947 and Audrey Batten (née Knight-Law) found a parasitized fully grown larva at Blackheath on 29 July 1947. On the Lewisham side of Blackheath JFB discovered four larvae on rosebay willowherb on a bomb-site on 13 August 1948. Also at Blackheath, D.F. Owen found several fully grown larvae on rosebay willowherb on 26 and 29 August 1951 on a bomb-site near the Hare and Billet Pond.

Deilephila porcellus (Linnaeus) **L** SMALL ELEPHANT HAWK-MOTH
We have not discovered any early records of this species at Blackheath or in Greenwich Park, but on 13 September 1946 JFB found a single larva on rosebay willowherb on a

bomb-site at Blackheath. The date was incorrectly given as 16 September in Chalmers-Hunt (1960-81). The larva pupated, but the moth failed to emerge the following spring.

Hippotion celerio (Linnaeus) SILVER-STRIPED HAWK-MOTH
West reported the occurrence of this very rare immigrant at Greenwich in 1865 to the *Proceedings of the South London Entomological and Natural History Society* for 1910–11, page 103 (Chalmers-Hunt 1960–81).

NOTODONTIDAE

Cerura vinula (Linnaeus) PUSS MOTH
As well as being listed in 1902 for Greenwich Park, the puss moth was reported in Grinling from Blackheath, Westcombe Park, Greenwich and Lewisham. It was still plentiful in the area in the late 1940s: for instance, D.F. Owen found a good many eggs and larvae on aspen, poplars and willows at Blackheath in 1947, as JFB did at nearby Charlton in 1946 and 1947.

Furcula furcula (Clerck) SALLOW KITTEN
West found imagines of this species at Blackheath on several occasions in June drying their wings at 6 p.m. He also bred the moth from larvae and pupae found on willow bark. It was not listed by Edwards for Greenwich Park and we know of no other records.

Furcula bifida (Brahm) **L** POPLAR KITTEN
Recorded in Greenwich Park by Edwards in 1902 and at Blackheath by West. The latter collected larvae and pupae from poplars, but said the pupae of this and the last species are very difficult to find as 'they are finished off very neatly between the cracks of the bark.' B.W. Adkin also found the species at Blackheath and A.H. Jones used formerly to find the moths on palings near Greenwich Park (Grinling).

Notodonta dromedarius (Linnaeus) IRON PROMINENT
The only record for this area of which we are aware is of one caught on 26 May 1960 by A.A. Allen (Chalmers-Hunt 1960–81) in the m.v. light trap which he operated in his garden at Blackheath Park. However, at nearby Charlton, JFB found one resting on a fence in his garden on 7 September 1948.

Notodonta ziczac (Linnaeus) PEBBLE PROMINENT
Tutt stated in Grinling that this moth was generally distributed in the SE London area and mentioned its occurrence at 'Westcombe Park, etc.', and Lewisham. It was not, however, included by Edwards in his Greenwich Park list. We know of no later records.

Pheosia tremula (Clerck) SWALLOW PROMINENT
West reported finding one on a fence in Greenwich Park, but did not give the date. R. Adkin in Grinling stated that it was rare at Lewisham. We know of no other reports.

Ptilodon capucina (Linnaeus) COXCOMB PROMINENT
Included by Edwards in his Greenwich Park list in Webster. Tutt in Grinling stated that this moth was generally distributed in the SE London area and specifically mentioned Westcombe Park. K. H. Hyatt caught a single specimen at Blackheath on 3 May 1950, but we know of no other records, although D. F. Owen (pers.comm.) caught singletons at light at nearby Shooters Hill in 1951 and Sokoloff (1984) also found imagines there.

Pterostoma palpina (Clerck) PALE PROMINENT
West found imagines on fences at Blackheath, where B.W. Adkin also found it, and Robert Adkin caught one (his only record of the species) in 1883 in Lewisham (Grinling). It also appears in Edwards's Greenwich Park list in Webster. In May 1948 JFB caught a male at light at nearby Shooters Hill (Burton 1992). Much more recently, THF caught one at m.v. light in Greenwich Park's Bird Sanctuary on 17 May 2004.

Ptilophora plumigera (Denis & Schiffermüller) **Na** PLUMED PROMINENT
West used to find imagines of this species on fences at Blackheath. We have not heard of any reports since then.

Clostera curtula (Linnaeus) **L** CHOCOLATE-TIP
A. H. Jones (in Grinling) used to find imagines of this moth at rest on palings near Greenwich Park. We know of no other reports.

Phalera bucephala (Linnaeus) BUFF-TIP
Included by Edwards in his Greenwich Park list (Webster 1902) and described by Tutt in Grinling as generally distributed and abundant, including at Blackheath,

Greenwich, Westcombe Park and Lewisham. JFB, K. H. Hyatt, D. F. Owen and J. E. Owen found the buff-tip still numerous in the late 1940s and early 1950s. They came across large numbers of larvae on limes, elms, oaks and sallows at Blackheath and in Greenwich Park, and often dug up pupae from under these trees in the winter months. Much more recently, THF caught one at m.v. light by the Observatory in Greenwich Park on 23 June 2005.

Diloba caeruleocephala (Linnaeus) FIGURE OF EIGHT
Included by Edwards in his Greenwich Park list in Webster and reported from Lewisham by West. No other records known.

LYMANTRIIDAE

Orgyia antiqua (Linnaeus) VAPOURER
Described by Tutt in Grinling as abundant throughout the SE London area, the vapourer was specifically reported from Greenwich, Lewisham, Westcombe Park, etc., and was included by Edwards in his Greenwich Park list in Webster. It was still common in the district in the late 1940s and early 1950s, both in the imago and larval states. On 30 June 1947, for instance, J.E. Owen (per D.F. Owen pers. comm.) found 30 nearly fully grown larvae on an alien shrub at Blackheath and D.F. Owen reported larvae in abundance there on 30 August 1951. On 29 July 1947 JFB saw several imagines flying at Blackheath, where A.A. Allen (Chalmers-Hunt 1960–81) caught a male in his m.v. light trap in 1959. Since then the only records are from Greenwich Park where THF saw one flying in the daytime at One Tree Hill on 22 July 2004 and trapped another at m.v. light in the Bird Sanctuary on 12 August 2005.

Calliteara pudibunda (Linnaeus) PALE TUSSOCK
The only record of which we are aware from this area is Edwards's inclusion of the species in his Greenwich Park list in Webster.

Euproctis chrysorrhoea (Linnaeus) **L** BROWN-TAIL
This species was included by Edwards in his Greenwich Park list in Webster, but we are rather doubtful of its authenticity. Furthermore, the statement in de Worms (1953–58): 'Lewisham and Greenwich Park, scarce (D. Owen)', must be erroneous. JFB and Owen were very close friends and the former never heard him mention finding the brown-tail in this district, although he remembers him breeding larvae at home in Lewisham that he collected from Canvey Island, Essex. However, starting in 1967, a plague of the species occurred in east London in the 1970s, on both sides of the Thames, and the spot map in Plant (1993) shows that it was present in the Borough of Greenwich through to the 1980s. A.A. Allen (1970*a*) caught a single male in his garden m.v. moth trap at Blackheath Park on the night of 15 July 1969. Recently, THF caught 11 at m.v. light in Greenwich Park on 6 July 2004, and one on 4 July 2008.

Euproctis similis (Fuessly) YELLOW-TAIL
Included by Edwards in his Greenwich Park list (Webster 1902) and reported from Blackheath, Westcombe Park and Lewisham in Grinling. Since then the only record is of one caught by THF at m.v. light at Greenwich Park's Observatory on 6 July 2004, the same night as the brown-tails mentioned above.

Leucoma salicis (Linnaeus) **L** WHITE SATIN MOTH
Also included in Edwards's Greenwich Park list in Webster. West used to collect the larvae of this moth from poplars growing at Blackheath, but we know of no more recent records from this district, although JFB collected a larva from a poplar at Lee Green on 17 July 1946, not far from Blackheath.

ARCTIIDAE

Nudaria mundana (Linnaeus) **L** MUSLIN FOOTMAN
West used to find imagines at rest on fences at Blackheath. No other records known.

Eilema complana (Linnaeus) **L** SCARCE FOOTMAN
Included by Edwards in his Greenwich Park list in Webster and recorded at Morden College, Blackheath, by H.E. Page (in Grinling). Fenn wrote that this species used to be fairly common in the SE London area, but 'now it is only occasionally met with'. Much more recently, THF recorded at m.v. light in Greenwich Park: one on 22 July 2004; one on 23 June and another on 12 August 2005.

Eilema depressa (Esper) **L** BUFF FOOTMAN
The only record of which we are aware is of a moth caught by THF at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004.

Eilema lurideola (Zincken) COMMON FOOTMAN
Curiously, the only record of this common moth in the area is the one captured by THF at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004.

Arctia caja (Linnaeus) GARDEN TIGER
Writing about the SE London area, Fenn remarked that *caja* 'used to swarm in the larval state on every weedy bank, but this is no longer the case'. West wrote, however, that the larvae were common everywhere on nettle and dock. Tutt, compiling in 1907 the records in Grinling, stated that the species was generally distributed and specifically mentioned its occurrence at Greenwich, Westcombe Park and Blackheath. Edwards in Webster listed it for Greenwich Park. In the late 1940s, JFB, K.H. Hyatt and D.F. Owen found the larvae so commonplace that they did not usually record in their diaries and journals seeing them. However, JFB did report finding a moth at rest in Greenwich Park on 11 July 1946. The spot distribution map in Plant (1993) indicates its presence in the Blackheath–Greenwich Park area, but THF did not come across it in his 2004–2006 survey.

Diacrisia sannio (Linnaeus) **L** CLOUDED BUFF
Newman (1869) stated that the males of this moth 'used to be very abundant on Blackheath among the furze and fern, twenty years ago', but that it had not been seen there since.

Spilosoma lubricipeda (Linnaeus) WHITE ERMINE
Included by Edwards in his Greenwich Park list in Webster and described by Tutt in Grinling as 'abundant throughout, especially in gardens. — Westcombe Park, Blackheath, etc.' This was still more or less its status in the late 1940s and early 1950s and seems to continue to be so nowadays. Plant (1993) reported this to be the case in London generally, and indicates its presence at Blackheath and Greenwich Park in his spot distribution map. On 28 August 1951, D. F. Owen (pers. comm.) found larvae on sallow at Blackheath. In Greenwich Park, THF recorded single moths at m.v. light in the Bird Sanctuary on 7 June 2004, and 23 June 2005.

Chalmers-Hunt (1960–81) listed the following aberrations as having been captured in the district: June 1891: a specimen in the Rothschild-Cockayne-Kettlewell collection from Westcombe Park which had a large discal spot on the hindwing; 1894: a male in his own collection taken by J.F. Green in Greenwich Park which has the thorax, antennae, cilia and apical area of the forewings smoke-grey in colour; 1960: a specimen taken by A.A. Allen at Blackheath on 15 July with the spotting greatly reduced so that it much resembled the water ermine *Spilosoma urticae* (Esper).

Spilosoma luteum (Hufnagel) BUFF ERMINE
The notes written in respect of the white ermine for the period 1900 to 1951 apply more or less equally well to this species. However, THF did not come across it in his 2004–2006 survey of Greenwich Park.

Spilosoma urticae (Esper) **Nb** WATER ERMINE
West reported finding a specimen of this very local species 'at rest in my own garden'. As he resided in Greenwich all his life, we suspect that he did not mean Lewisham, as stated in Chalmers-Hunt (1960–81). Moreover, this may have been the 'Greenwich 1880' record reported in the *Proceedings of the South London Entomological and Natural History Society* for 1910–11, page 103.

Diaphora mendica (Clerck) MUSLIN MOTH
The only record we know of is the female reported by A.A. Allen in his garden at Blackheath Park about 1950 (Chalmers-Hunt 1960–81).

Phragmatobia fuliginosa (Linnaeus) RUBY TIGER
Chalmers-Hunt (1960–81) reported the occurrence of a specimen of the aberrant form *intermedia* Tutt at Greenwich in 1910. The same publication mentions the two imagines attracted by A.A. Allen to his m.v. trap at Blackheath Park in 1959 and the observer's comment that the species was commoner in 1960. Since then the only record of which we know is THF's capture of one at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004.

Euplagia quadripunctaria (Poda) **Nb** JERSEY TIGER
On 12 August 2005, THF trapped an individual (ab. *lutescens*) of this moth at the Observatory site in Greenwich Park. On the face of it this was a very unlikely location for a species normally confined as a resident to south Devon, Dorset and the coast eastwards to Sussex, apart from an isolated population near Folkestone, Kent. However, since about 2004 the Jersey tiger has colonized suburban SE London (Plant

2006) and so it is not surprising that it has appeared in our area. It is suspected of being an immigrant from the European mainland, a probable source in view of the recent climate warming, although the release of bred stock cannot be entirely ruled out.

Callimorpha dominula (Linnaeus) **L** SCARLET TIGER
This tiger moth originally occurred at Blackheath and at nearby Charlton but was said to have died out by about 1829 (de Worms 1953–58, Plant 1993).

Tyria jacobaeae (Linnaeus) CINNABAR
In Grinling the cinnabar was described as 'generally distributed but not common, outside the London district — Brockley, Lee, Lewisham, etc.' In the 1940s and early 1950s, JFB used to find it commonly, especially the larvae, in the outer suburbs, but the nearest locality at that time to Blackheath was in Charlton Sandpit, where the larvae were often numerous on Oxford ragwort. Apparently, since then the species has become much more numerous in the inner suburbs and the distribution map in Plant (1993) indicates a cluster of spots in the Blackheath and Greenwich districts. A.A. Allen noted its presence at Blackheath in the 1950s and early 1960s, including two imagines in 1963 on the late date of 2 August (Chalmers-Hunt 1960–81). On 17 May 2004, THF recorded one at m.v. light in Greenwich Park's Bird Sanctuary.

NOLIDAE

Nola cucullatella (Linnaeus) SHORT-CLOAKED MOTH
Included by Edwards in his Greenwich Park list in Webster and reported by West on fences at Blackheath. He used to find the larvae on blackthorn at nearby Lewisham and Kidbrooke. JFB and D.F. Owen never came across the species in the Blackheath district in the 1940s and '50s. However, the spot distribution map in Plant (1993) indicates its occurence just to the east of Blackheath, though THF did not record it in his 2004–2006 survey of Greenwich Park.

NOCTUIDAE

Euxoa tritici (Linnaeus) WHITE-LINE DART
This noctuid, which was recorded from the Greenwich Marshes by Fenn (in Grinling) was reported from Blackheath in August 1960 by A.A. Allen: he attracted several to m.v. light (Chalmers-Hunt 1960–81).

Euxoa nigricans (Linnaeus) GARDEN DART
Around 1900 this moth was locally abundant in the Greenwich district, especially in the market gardens that then existed on the Greenwich Marshes (recorded there in August 1862 by Fenn), but it has become far less numerous since those days. JFB and D.F. Owen rarely came across it in the 1940–'50s. The nearest record to Blackheath in the distribution map in Plant (1993) is farther south in the Lewisham district and THF did not find it during his 2004–2006 survey of Greenwich Park.

Agrotis segetum (Denis & Schiffermüller) TURNIP MOTH
Included by Edwards in his Greenwich Park list in Webster and mentioned by West (1906) as occurring at Blackheath, the turnip moth was described by Tutt (in Grinling) as abundant everywhere. JFB found it much less so in the 1940s and 1950s, but Plant (1993) assessed it as a very widespread and common resident in the London Area and indicated its presence in the Blackheath district in his distribution map. On 6 June 1947, JFB found an imago in the Roan School just outside the wall of Greenwich Park, and during his survey THF recorded it also at m.v. light in the Park: two on 6 July and one on 4 September 2004; four on 12 August 2005.

Agrotis clavis (Hufnagel) HEART & CLUB
Until THF's 2004–2006 survey this species had not been reported in our area: he recorded it at m.v. light in Greenwich Park as follows: 18 on 6 July, and three on 22 July 2004; 23 on 23 June 2005.

Agrotis exclamationis (Linnaeus) HEART & DART
Recorded by Edwards in Greenwich Park and at Blackheath by West, it was described in Grinling as everywhere abundant in the SE London area. This was still more or less its status in the 1940s–'50s, and in the early 1990s (Plant 1993). Its presence in the Blackheath district at that period is indicated in the distribution map in Plant's book. In Greenwich Park, THF trapped the following at m.v. light: one on 17 May, 10 on 7 June, 87 on 6 July, and 30 on 22 July 2004; 119 on 23 June 2005.

Agrotis ipsilon (Hufnagel) DARK SWORD-GRASS
Included by Edwards in his Greenwich Park list and in Greenwich by Tutt in Grinling. We know of no reports of this immigrant in the 1940s and 1950s, or subsequently, until THF's Greenwich Park survey when he recorded the following at m.v. light, all at the Observatory: one on 6 July and five on 22 July 2004; one on 23 June 2005.

Agrotis puta (Hübner) SHUTTLE-SHAPED DART
Listed for Greenwich Park by Edwards in Webster and by West for Blackheath, *puta* was also reported from Greenwich and Westcombe Park by Tutt in Grinling. It continued to be plentiful in this area in the 1940s and into the 1950s, where JFB and K. H. Hyatt found imagines at Blackheath, Charlton and Kidbrooke. Its continued presence in this district is indicated in the distribution map in Plant (1993) and by THF's survey of Greenwich Park as follows: one on 11 May, two on 17 May, one on 6 July and another on 22 July, one on 4 September 2004; four on 23 June, 40 on 12 August, and two on 11 October 2005.

Axylia putris (Linnaeus) FLAME
Also listed for Greenwich Park by Edwards, this species was stated by Tutt and West in Grinling to occur at Blackheath, Greenwich and Westcombe Park but to be 'not common'. Its status remained the same in the 1940s–'50s; JFB had an imago emerge on 24 May 1947 from a pupa he dug up in Greenwich Park the previous winter. D.F. Owen also found an imago there (de Worms (1953–58). Plant (1993) considered it a widespread and common resident in the London area generally and indicated its continued presence at Blackheath in his distribution map. In Greenwich Park, THF trapped at m.v. light: one on 6 July and two on 22 July 2004.

Ochropleura plecta (Linnaeus) FLAME SHOULDER
Reported from Greenwich Park by Edwards in Webster and from Greenwich, Westcombe Park and Blackheath in Grinling. K. H. Hyatt collected a specimen at Blackheath on 13 August 1952, and Plant (1993) indicated its occurrence there in his spot distribution map, whilst THF recorded the following at m.v. light in Greenwich Park: three on 17 May and one on 22 July 2004; one on 12 August 2005.

Noctua pronuba (Linnaeus) LARGE YELLOW UNDERWING
Included by Edwards in his Greenwich Park list and described as 'extremely abundant everywhere' in Grinling, it has continued to be so. JFB, K. H. Hyatt and D. F. Owen found it frequently at Blackheath and in Greenwich Park in the 1940s and early 1950s. The distribution map in Plant (1993) indicated its continued presence in this area in the early 1990s. In his survey of the Park THF recorded it at m.v. light as follows: one on 7 June, five on 6 July, 79 on 22 July, and 58 on 4 September 2004; 14 on 23 June, eight on 12 August, and six on 11 October 2005.

Noctua comes Hübner LESSER YELLOW UNDERWING
Included by Edwards in his Greenwich Park list, but, apart from Robert Adkin's report of its occurrence in the Lewisham district, the Blackheath district is not specifically mentioned in Grinling. D.F. Owen (pers. comm.) reported the capture of one at dusk at Blackheath on 29 August 1951 and the distribution map in Plant (1993) shows its continued presence in the area, which was confirmed by THF's survey of Greenwich Park where he recorded the following at m.v. light: three on 22 July and three on 4 September 2004; two on 23 June and four on 11 October 2005.

Noctua fimbriata (Schreber) BROAD-BORDERED YELLOW UNDERWING
Described in Grinling as common in the larval stage in the SE London-NW Kent area and also included by Edwards in his Greenwich Park list. The only other record of which we are aware until THF's 2004–2006 survey of Greenwich Park was the one JFB and D.F. Owen found dead on a path by the Ranger's House in the Park on 13 August 1950. THF recorded moths at m.v. light as follows: one on 6 July, two on 22 July and six on 4 September 2004; one on 23 June and three on 12 August 2005. All were captured at the Observatory site.

Noctua janthe (Borkhausen) LESSER BROAD-BORDERED YELLOW UNDERWING
Included by Edwards in his Greenwich Park list, the only other report from the Blackheath area before 2004 of which we are aware is of a specimen collected by K. H. Hyatt at Blackheath on 23 August 1952, although it was reported in Grinling to be generally distributed in the SE London area, specifically mentioning the Lewisham district and nearby Kidbrooke. Using m.v. light traps, THF recorded the following imagines in Greenwich Park: five on 22 July and nineteen on 4 September 2004; plus three on 12 August 2005.

Noctua interjecta Hübner ssp. *caliginosa* Schawerda LEAST YELLOW UNDERWING
Only one record: Blackheath, 25 July 1952, K. H. Hyatt (de Worms 1953–58, Chalmers-Hunt 1960–81).

Graphiphora augur (Fabricius) DOUBLE DART
Included by Edwards in his Greenwich Park list and in Grinling from Greenwich, Westcombe Park and the Lewisham district, etc. No other records.

Lycophotia porphyrea (Denis & Schiffermüller) TRUE LOVER'S KNOT
According to de Worms (1953–58) this species was recorded in Greenwich Park by D.F. Owen. This individual, and another captured by A. A. Allen at m.v. light at Blackheath in 1959 (Chalmers-Hunt 1960–81), presumably wandered from Abbey Wood (eight kilometres distant), the nearest known suitable breeding locality. We know of no other reports.

Peridroma saucia (Hübner) PEARLY UNDERWING
Included by Edwards in his Greenwich Park list in Webster. The only other record before 2005 is of a male with a badly deformed right hindwing found on a path in the Park on 10 November 1947 by J.E. Owen (per D.F. Owen). An immigrant species, this individual must have bred here. Also in Greenwich Park, THF recorded at m.v. light an imago on 12 August 2005 at the Observatory site.

Diarsia mendica (Fabricius) INGRAILED CLAY
Included by Edwards in his Greenwich Park list and described by Tutt (in Grinling) as common at Blackheath and Westcombe Park. No other records.

Diarsia brunnea (Denis & Schiffermüller) PURPLE CLAY
Reported from Westcombe Park by Tutt (in Grinling). Not listed by Edwards and no other records.

Diarsia rubi (Vieweg) SMALL SQUARE-SPOT
Reported as abundant at Greenwich and Westcombe Park by Tutt in Grinling. Not listed by Edwards and no other records before 2004, although Plant (1993) described this species as widespread and very common in the London Area, and indicated in his distribution map its occurrence just south of Blackheath. On 4 September 2004, THF caught a moth at m.v. light in Greenwich Park's Bird Sanctuary.

Xestia c-nigrum (Linnaeus) SETACEOUS HEBREW CHARACTER
Listed for Greenwich Park by Edwards in Webster and described in Grinling as common at Greenwich, Blackheath and Westcombe Park, it remained so in the 1940s and '50s, and, judging by Plant (1993), continues to be a widespread and very common resident in the London Area nowadays. This was confirmed by THF recording the following at m.v. light in Greenwich Park: one on 7 June, one on 6 July, and 12 on 4 September 2004; four on 23 June and two on 12 August 2005. Numbers are often boosted by immigration.

Xestia triangulum (Hufnagel) DOUBLE SQUARE-SPOT
Although described in Grinling as generally distributed and common in the larval stage, the only localities given are the Lewisham (also given by West in 1906) and Lee districts, just outside our area. However, de Worms (1953–58) stated that it had been recorded in Greenwich in 1898. Not listed by Edwards and no other later records.

Xestia baja (Denis & Schiffermüller) DOTTED CLAY
Recorded by Edwards in Greenwich Park (Webster 1902) and from Greenwich and Westcombe Park in Grinling. No other records.

Xestia sexstrigata (Haworth) SIX-STRIPED RUSTIC
Reported from Blackheath by West. Not recorded by Edwards and no later reports.

Xestia xanthographa (Denis & Schiffermüller) SQUARE-SPOT RUSTIC
Described in Grinling as generally distributed and abundant in the SE London area, it was still so in the Blackheath district in the period 1945–1958 and remains so nowadays, judging by the numbers of imagines recorded at m.v. light in Greenwich Park by THF during his survey: one on 22 July, 29 on 4 September 2004; plus two on 11 October 2005.

Naenia typica (Linnaeus) **L** GOTHIC
Included by Edwards in his Greenwich Park list in Webster and reported in Grinling from Westcombe Park by H.E. Page, and from the Lewisham district (presumably including the southern part of Blackheath). Fenn caught specimens in the Greenwich Marshes in 1861, 1862 and 1886, all in the month of July (Chalmers-Hunt 1960–81). In the 1950s, A.A. Allen used to see imagines at the street lamps at Blackheath and

once found three larvae feeding on apples. JFB's only record is of one he caught at nearby Charlton on 4 June 1947.

Eurois occulta (Linnaeus) **Nb** GREAT BROCADE
The only record is of one found by Fenn on a street lamp at Blackheath on 22 August 1862 (Chalmers-Hunt 1960–81).

Discestra trifolii (Hufnagel) NUTMEG
Not mentioned by Edwards, but stated by Tutt in 1907 to be abundant at Westcombe Park, Blackheath and Greenwich, this species was reported by Plant (1993) to be a widespread and common resident in all parts of the London Area, and his distribution map indicates its presence just to the west of Greenwich Park. On 29 May 1948, K.H. Hyatt took a specimen at Blackheath Park (pers. comm.), which is also mentioned in de Worms (1953–58), and a further specimen at Blackheath on 15 July 1952.

Hada plebeja (Linnaeus) SHEARS
Reported from Greenwich Park by Edwards in 1902, from Blackheath and Greenwich by West and from Westcombe Park by Tutt (Grinling 1909). No other records.

Polia nebulosa (Hufnagel) GREY ARCHES
Reported from Greenwich Park by Edwards from Blackheath by West. No other records.

Mamestra brassicae (Linnaeus) CABBAGE MOTH
Reported from Greenwich Park by Edwards and by Tutt in Grinling as 'most abundant everywhere'. It was common in the SE London area in the late 1940s and early 1950s, and JFB, K. H. Hyatt and D. F. Owen found imagines at Blackheath and Greenwich Park.

Melanchra persicariae (Linnaeus) DOT MOTH
Included by Edwards in his Greenwich Park list and reported by Tutt in Grinling from Blackheath, Westcombe Park, etc., and described as abundant. It was still so in the 1940s and early 1950s. JFB found imagines in Greenwich Park, and at nearby Charlton he discovered larvae in abundance on the foliage of potato plants in late September 1946 and, on 4 September 1951, several larvae on delphinium plants in his garden. No later reports.

Melanchra pisi (Linnaeus) BROOM MOTH
Not reported by Edwards or by Grinling for the Blackheath and Greenwich districts around 1900, but D.F. Owen (pers. comm.) found the larvae 'quite common' at Blackheath in 1946 and 1947. No later reports.

Lacanobia contigua (Denis & Schiffermüller) **L** BEAUTIFUL BROCADE
This species, which has apparently disappeared from its former haunts in north-west Kent (Plant 1993), used to occur at Blackheath (West 1906) and nearby Shooters Hill (Grinling 1909).

Lacanobia w-latinum (Hufnagel) **L** LIGHT BROCADE
Not reported from Greenwich Park by Edwards, but West bred imagines from a female moth he found in the Park. It was also reported from Westcombe Park by Fenn (Grinling). No later records.

Lacanobia thalassina (Hufnagel) PALE-SHOULDERED BROCADE
Recorded at Lewisham in Grinling, but not specifically from Blackheath or Greenwich Park. No later records.

Lacanobia suasa (Denis & Schiffermüller) **L** DOG'S TOOTH
This species was recorded from Greenwich in the *Victoria County History of Kent* (1908) and, much more recently, was found in ruderal habitats beside the Thames (see distribution map in Plant 1993). No actual reports from Blackheath or Greenwich Park.

Lacanobia oleracea (Linnaeus) BRIGHT-LINE BROWN-EYE
Included by Edwards in his Greenwich Park list in Webster and reported as generally distributed and abundant in Grinling, with Greenwich, Westcombe Park and Lewisham specifically mentioned, it was still more or less so in the 1940s and early 1950s. D.F. Owen took it at Blackheath in 1951, and K. H. Hyatt, also at Blackheath, in 1952 and 1958. It is apparently less plentiful nowadays, although judging by the distribution map in Plant (1993) it is still widespread in the SE London area. In recent years, THF recorded the following at m.v. light in Greenwich Park: one on 6 July and four on 22 July 2004.

Hecatera bicolorata (Hufnagel) BROAD-BARRED WHITE
Included by Edwards in his Greenwich Park list (Webster 1902). West found it very commonly on fences at Blackheath. It was still quite plentiful in the 1940s when JFB and D.F. Owen found it on the trunks of cedar and oak, and on walls in Greenwich Park and on willow trunks on Blackheath. It may still occur, but we know of no more recent records.

Hadena rivularis (Fabricius) CAMPION
West used to find larvae of this moth at Greenwich in the seedpods of campion, although he did not specifically mention Greenwich Park. It was also reported in Grinling from Greenwich by Tutt. At Blackheath in 1960, A.A. Allen caught one at m.v. light on 2 June and another on 21 July (Chalmers-Hunt 1960–81). Its recent occurrence in Greenwich Park was recorded by THF who caught an imago at m.v. light at the Bird Sanctuary site on 17 May 2004, and recorded a larva at the Reservoir on 22 July that year.

Hadena perplexa (Denis & Schiffermüller) TAWNY SHEARS
Also reported found as larvae in Greenwich by West. No other records.

Hadena compta (Denis & Schiffermüller) VARIED CORONET
This recent colonist was not recorded in north-west Kent until 1971 and is now a widespread and very common resident in the London Area (Plant 1993). Although we are unaware of any specific records from Blackheath or Greenwich Park, Plant's distribution map indicates its occurrence at East Greenwich, close to the Thames.

Hadena confusa (Hufnagel) **L** MARBLED CORONET
A. A. Allen caught one of these very local and scarce moths in his m.v. light trap at Blackheath (Chalmers-Hunt 1960–81); date not given, but presumably in the 1950s.

Hadena bicruris (Hufnagel) LYCHNIS
Another species found as larvae at Greenwich by West and also mentioned in Buckell and Prout (1898–1901) as having been found there. Tutt in Grinling also mentioned its occurrence in Greenwich in the seedpods of sweet william in gardens there, as well as at Westcombe Park and Blackheath. No other records.

Tholera decimalis (Poda) FEATHERED GOTHIC
Listed for Greenwich Park by Edwards in Webster and for Blackheath by West. No other records.

Orthosia cruda (Denis & Schiffermüller) SMALL QUAKER
Stated by Tutt in Grinling to be generally distributed and abundant, but the only specific early record of this moth in our area is its inclusion in the Greenwich Park list contributed by Edwards to Webster. That it still occurs in the Park was confirmed by THF who recorded three at m.v. light on 12 April 2006. This species was, and still is, common in the Shooters Hill woods about four kilometres to the east.

Orthosia gracilis (Denis & Schiffermüller) POWDERED QUAKER
Described as local in Grinling, the only specific record of this species in our area is its inclusion by Edwards in his Greenwich Park list (Webster 1902).

Orthosia cerasi (Fabricius) COMMON QUAKER
Listed for Greenwich Park by Edwards and for Westcombe Park by Tutt in Grinling. Much more recently, THF recorded the following imagines at m.v. light in Greenwich Park: one on 11 May 2004, and eight on 12 April 2006.

Orthosia incerta (Hufnagel) CLOUDED DRAB
Described by Tutt in Grinling as generally distributed in SE London and common in the larval stage, he reported it from Westcombe Park, as did West from Greenwich and Edwards in 1902 from Greenwich Park. In the late 1940s, JFB, K.H. Hyatt and D.F. Owen dug up and bred out many pupae of this moth from under elms and other trees in Greenwich Park and on Blackheath. In the latter locality Owen (pers.comm.) recorded collecting larvae from willow trunks, including those growing around Folly Pond, close to the south wall of Greenwich Park. However THF recorded only one specimen during his recent survey of the Park; it was taken at m.v. light by the Observatory on 12 April 2006.

Orthosia munda (Denis & Schiffermüller) TWIN-SPOTTED QUAKER
Included by Edwards in his Greenwich Park list for Webster. The only record since then is THF's capture of five at m.v. light in the Park's Bird Sanctuary on 12 April 2006.

Orthosia gothica (Linnaeus) HEBREW CHARACTER
Listed for Greenwich Park by Edwards and reported from Blackheath and Westcombe Park in Grinling. The only records in the area since then are THF's capture of 13 at m.v. light on 12 April 2006, so the species still seems to be at least not uncommon. It was and still is common in the woodlands of nearby Shooters Hill (Burton 1992).

Mythimna conigera (Denis & Schiffermüller) BROWN-LINE BRIGHT-EYE
Reported from Blackheath and Greenwich in Grinling. K. H. Hyatt collected a male at Blackheath on 17 July 1952.

Mythimna ferrago (Fabricius) CLAY
Listed for Greenwich Park by Edwards (Webster 1902) and reported from Greenwich and Westcombe Park in Grinling. Captured by D.F. Owen (pers. comm.) at dusk at the former bomb-site near the Hare and Billet Pond on Blackheath on 29 August 1951, and a specimen taken by K. H. Hyatt at Blackheath on 1 July 1952. Since then THF has trapped it at m.v. light as follows in Greenwich Park: one on 6 July, and another on 22 July 2004, then two on 12 August 2005.

Mythimna impura (Hübner) SMOKY WAINSCOT
Reported from Greenwich, Westcombe Park and Lewisham in Grinling. Much more recently, THF recorded the following imagines at m.v. light in Greenwich Park: five on 6 July and 10 on 22 July 2004, plus two on 23 June 2005.

Mythimna pallens (Linnaeus) COMMON WAINSCOT
Listed for Greenwich Park by Edwards (Webster 1902) and reported from Greenwich, Westcombe Park and Blackheath in Grinling. D.F. Owen (pers. comm.) reported that his brother, J.E. Owen caught one flying by day in Greenwich Park on 30 June 1947. Since then THF has recorded singles at m.v. light on 7 June and 6 July 2004, and on 23 June 2005.

Mythimna comma (Linnaeus) SHOULDER-STRIPED WAINSCOT
Included by Edwards in his Greenwich Park list in Webster and reported by Tutt in Grinling from Greenwich, Westcombe Park and Lewisham. Nowadays it appears to be plentiful in the area as THF recorded the following at m.v. light in Greenwich Park: three on 6 July and one on 22 July 2004; 17 on 23 June 2005.

Cucullia absinthii (Linnaeus) **Nb** WORMWOOD
The only record is of two imagines attracted by A.A. Allen to m.v. light at Blackheath in 1959 (Chalmers-Hunt 1960–81).

Cucullia chamomillae (Denis & Schiffermüller) **L** CHAMOMILE SHARK
Recorded in Greenwich Park both by Edwards (Webster 1902) and by West in May 1874 and 1875 on fences. The latter also used to find the larvae in July on the borders of cornfields at nearby Kidbrooke. The species was also found by Robert Adkin at Lewisham (Grinling 1909). No later records.

Cucullia umbratica (Linnaeus) SHARK
Recorded by West from Greenwich, but not specifically in the Park. No other records, apart from an imago found by K.H. Hyatt at rest at nearby Kidbrooke on 6 June 1947.

Cucullia verbasci (Linnaeus) MULLEIN
Although reported by West from nearby Kidbrooke, the only record of which we are aware in our area before 2004 concerns the nearly fully grown larva which JFB and D.F. Owen found on 10 June 1949 on great mullein, then growing in plenty around the former shallow gravel pit in the Wilderness in Greenwich Park. There were signs of more larvae having fed on other mullein plants nearby but they failed to find them. The species' continued presence in the Park is suggested by THF's capture of an imago at m.v. light in the adjacent Bird Sanctuary on 17 May 2004.

Calophasia lunula (Hufnagel) TOADFLAX BROCADE
The first record of this species in our area was the discovery by THF (Freed 2004, 2007) of 11 larvae on 14 August 2004 feeding on an isolated clump of common toadflax growing on One Tree Hill in Greenwich Park. J. Clifton also found larvae at the same site in the Park during 2009. Since 2000 the toadflax brocade has expanded its breeding range from restricted haunts on the coasts of Kent and Sussex and has been colonizing the London area since 2002, apparently in response to climate warming (Freed 2007). Burton (1998) had earlier drawn attention to the westward expansion of this species on the European mainland in apparent response to climate warming.

Aporophyla lutulenta (Denis & Schiffermüller) DEEP-BROWN DART
The first and only record for this species was a singleton taken by H. Whitehead at m.v. light at the Bird Sanctuary site in Greenwich Park on 25 September 2009.

Aporophyla nigra (Haworth) BLACK RUSTIC
Before 1950, this moth was considered to be an extremely rare vagrant or immigrant. Since then it has spread into the London Area from the south-west and is now well established and numerous, especially in the southern part of the area (Plant 1993 — see his distribution map). In 1970 it had appeared at Lee, close to Blackheath. On 11 October 2005, THF caught two imagines at m.v. light at the Observatory site in Greenwich Park.

Lithophane leautieri (Boisduval) ssp. *hesperica* Boursin BLAIR'S SHOULDER-KNOT
This species first appeared in England in 1951 and has since colonized most of the country, including the London Area, where it arrived in November 1972. It is now a common moth in the suburbs as well as in more rural districts. So far though, the only record of it in this area is THF's capture of two at m.v. light at the Observatory site in Greenwich Park on 11 October 2005.

Xylena vetusta (Hübner) **L** RED SWORD-GRASS
Included by Edwards in his Greenwich Park list for Webster. Stated by Fenn to have apparently disappeared from the SE London area and by Tutt in Grinling as rare in north-west Kent. Plant (1993) considered the species to be now extinct in the London Area.

Xylena exsoleta (Linnaeus) **Nb** SWORD-GRASS
Same comments as for the previous species.

Xylocampa areola (Esper) EARLY GREY
Reported from Greenwich Park by Edwards and from Blackheath by West in Grinling. No other reports.

Allophyes oxyacanthae (Linnaeus) GREEN-BRINDLED CRESCENT
Included by Edwards in his Greenwich Park list (Webster 1902) and reported by R. Adkin from the adjacent Lewisham district (Grinling). A.A. Allen informed Chalmers-Hunt (1960–81) that he twice, in 1955 and 1956, found larvae on a hawthorn hedge at Blackheath. We know of no other records.

Dichonia aprilina (Linnaeus) MERVEILLE DU JOUR
Also included by Edwards in his Greenwich Park list, but no other records.

Polymixis flavicincta (Denis & Schiffermüller) **L** LARGE RANUNCULUS
Reported from Blackheath by West. Old pre-1970 records are indicated in the distribution map in Plant (1993), otherwise no other records.

Eupsilia transversa (Hufnagel) SATELLITE
Included by Edwards in Webster, but no other reports, although it used to occur in plenty as near as Shooters Hill and still does (Burton 1992).

Conistra vaccinii (Linnaeus) CHESTNUT
Described by Tutt in Grinling as generally distributed and common in the SE London area, this moth was included in Edwards's Greenwich Park list and reported by Robert Adkin from Lewisham. In 1947, D.F. Owen (pers comm.) found the typical form on a willow trunk at Blackheath, and he and JFB found it in plenty in the woods of nearby Shooters Hill in 1948–1951, and it was recorded there quite recently (Burton 1992). That it is still present in good numbers in the Blackheath area is indicated by THF's records of one at m.v. light in Greenwich Park's Bird Sanctuary on 11 October 2005, followed by a further eight there on 12 April 2006.

Conistra ligula (Esper) DARK CHESTNUT
Reported from Greenwich Park by Edwards (Webster 1902) and from Lewisham by Robert Adkin in Grinling. No other records.

Agrochola circellaris (Hufnagel) BRICK
Included by Edwards in his Greenwich Park list. No other records.

Agrochola lota (Clerck) RED-LINE QUAKER
Also included by Edwards in his Greenwich Park list and reported from Westcombe Park and Lewisham in Grinling. No other records.

Agrochola macilenta (Hübner) YELLOW-LINE QUAKER
Reported from Lewisham in 1867 by R. Adkin in Grinling and included by Edwards in his Greenwich Park list in Webster. No other records.

Agrochola helvola (Linnaeus) FLOUNCED CHESTNUT
Listed from Greenwich Park by Edwards. No other records.

Agrochola litura (Linnaeus) BROWN-SPOT PINION
Recorded by Edwards from Greenwich Park and reported by A.A. Allen in 1959 to be 'not uncommon at m.v. light' at Blackheath (Chalmers-Hunt 1960–81).

Agrochola lychnidis (Denis & Schiffermüller) BEADED CHESTNUT
Listed for Greenwich Park by Edwards in Webster and described in Grinling as generally distributed and common in the SE London area with reports from Westcombe Park and Lewisham. On 15 October 1949, K. H. Hyatt found one at Blackheath, whilst on 16 October 1951, D.F. Owen (pers. comm.) found a worn imago at rest on a horse chestnut trunk in Greenwich Park, and JFB and K.H. Hyatt also found one there on 12 October 1952. Hyatt caught a further specimen at light at Blackheath on 7 October 1957.

Atethmia centrago (Haworth) CENTRE-BARRED SALLOW
The only record for the area appears to be the imago caught at m.v. light by THF at the Bird Sanctuary site in Greenwich Park on 4 September 2004.

Omphaloscelis lunosa (Haworth) LUNAR UNDERWING
Described by Tutt in Grinling as generally distributed and abundant in the SE London area, and reported from Blackheath. The only recent record appears to be an imago caught by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 11 October 2005.

Xanthia citrago (Linnaeus) ORANGE SALLOW
Included by Edwards in his Greenwich Park list and reported from Blackheath by Fenn in Grinling. No other reports.

Xanthia aurago (Denis & Schiffermüller) BARRED SALLOW
The first and only record for this species in our area is of a singleton taken by H. Whitehead at m.v. light at the Bird Sanctuary site in Greenwich Park on 25 September 2009.

Xanthia icteritia (Hufnagel) SALLOW
Included by Edwards in his Greenwich Park list and reported by R. Adkin (Grinling 1909) from nearby Lewisham in 1867. No later records.

Xanthia ocellaris (Borkhausen) **Na** PALE-LEMON SALLOW
Apart from A. A. Allen's capture at Blackheath of a male of this very local and scarce species at m.v. light on 23 September 1961, as well as a few pre-1980 records indicated for the Blackheath area in Plant (1993), we are unaware of any other records.

Acronicta megacephala (Denis & Schiffermüller) POPLAR GREY
Reported in the distant past from Greenwich Park by Edwards and from Blackheath, Westcombe Park and Greenwich in Grinling, this moth was still a fairly plentiful resident at Blackheath and in Greenwich Park in the late 1940s and 1950s. No later further reports.

Acronicta aceris (Linnaeus) **L** SYCAMORE
According to Chalmers-Hunt (1960–81), the first published record of this species in Kent dates from Greenwich in 1830. The imagines and larvae were reported by West at Blackheath and Greenwich, and also by Tutt in Grinling at Westcombe Park as well as Blackheath. It was also listed for Greenwich Park by Edwards in Webster. Both imagines and larvae were still to be found in plenty at Blackheath and in Greenwich Park in the late 1940s and early 1950s. Our only more-recent record is of two caught by THF at m.v. light at the Obsevatory site in Greenwich Park on 22 July 2005.

Acronicta tridens (Denis & Schiffermüller) DARK DAGGER
Listed for Greenwich Park by Edwards in 1902, this is the only report for the area of which we are aware. Fenn commented that it used to be common in the larval state in the Lewisham district but had 'not been so noticed for years'.

Acronicta psi (Linnaeus) GREY DAGGER
Included by Edwards in his Greenwich Park list and reported by Tutt in Grinling from Blackheath and Westcombe Park. The latter stated that the dark-coloured ab. *suffusa* Tutt was the only form occurring in the Blackheath district. West also reported the grey dagger's occurrence at Blackheath and 'everywhere else in the district'. It was still numerous in the late 1940s and early 1950s: JFB, K. H. Hyatt, D.F. Owen and J.E. Owen frequently found the imagines at rest on the trunks of elms and sweet chestnuts in Greenwich Park and at Blackheath. In the present decade, THF recorded the

following at m.v. light at Greenwich Park's Observatory: one on 6 July and three on 22 July 2004, and five on 12 August 2005.

Acronicta rumicis (Linnaeus) KNOT GRASS

Described by Tutt in Grinling as scarce and mentioning only the nearby Greenwich Marshes, Charlton and Shooters Hill as localities where this moth had been found. Not included by Edwards in his Greenwich Park list either. However, in the late 1940s it was quite plentiful and JFB found imagines at Blackheath and in Greenwich Park, as did A.A. Allen (in Chalmers-Hunt 1960–81) at Blackheath in 1959 and 1960. It is apparently still plentiful as THF recorded the following at m.v. light at Greenwich Park's Observatory: five on 17 May and four on 22 July 2004, followed by one on 12 August 2005.

Cryphia algae (Fabricius) TREE-LICHEN BEAUTY

Until the beginning of the present century this moth was a very rare immigrant from the European mainland. Since then it has been colonizing inland parts of south-east England including central London where THF first recorded it in Regent's Park in 2003 (Freed 2004). He took it at m.v. light in Greenwich Park as follows: Bird Sanctuary: two on 22 July 2004 and one on 12 August 2005; Observatory: two on 12 August 2005. In 2008, Steele (2009) recorded eleven imagines at Blackheath on 30 July, apparently at m.v. light. Plant (1993) had no records of this moth in the London Area.

Cryphia domestica (Hufnagel) MARBLED BEAUTY

The first published record of this attractive moth in Kent dates from 1809 (Chalmers-Hunt 1960–81), when A.H. Haworth wrote '*Habitat ad Muros antiquos apud Greenwich Park, copiose. Larva in lichenibus crustaceis*'. Thus it seems always to have been fairly numerous on the seventeenth century walls of Greenwich Park, especially on those facing Blackheath and Maze Hill, presumably due to the survival there of its larval foodplants, lichens of the genera *Lecidea* and *Xanthoria*. This preference was also noticed by West. Edwards in Webster and H.E. Page in Grinling also reported finding the imagines on the walls of the Park and Robert Adkin came across them at Blackheath at that period. JFB, K.H. Hyatt, D.F. Owen and J.E. Owen also found them, often numerously, at rest on the olds walls of Greenwich Park in 1946 and 1947. On 27 June 1947, JFB found three newly emerged moths on one of the Park walls following the heaviest thunderstorm for twenty-one years. During a visit to Blackheath on 30 August 1983, JFB and D.F. Owen found an imago at rest on a wooden fence in Morden Lane, Blackheath. In the present decade, THF trapped at m.v. light at Greenwich Park's Observatory: three on 6 July 2004, and one on 23 June 2005.

Amphipyra pyramidea (Linnaeus) COPPER UNDERWING

Not recorded by Edwards (Webster 1902) in Greenwich Park nor for the Park or Blackheath in Grinling, although its occurrence at Lewisham in 1867–68 (R. Adkin) is mentioned. However, on 21 September 1952, JFB and K.H. Hyatt found an imago in fine condition in Greenwich Park. Recently, THF caught the following at m.v. light in the Park: two on 22 July and seven on 4 September 2004; one on 12 August and another on 11 October 2005. At Blackheath on 30 August 1972, A.A. Allen (1975*a*) reported finding seven imagines apparently aestivating under the bark of a moribund elm. He stated that this species and/or *A. berbera* is 'somewhat common in the district at light'.

Amphipyra berbera Rungs ssp. *svenssoni* Fletcher SVENSSON'S COPPER UNDERWING

The first record in our area of this species was from Greenwich Park's Observatory on 22 July 2004, when THF trapped three moths at m.v. light.

Amphipyra tragopoginis (Clerck) MOUSE MOTH

Recorded in Greenwich Park by Edwards, but not specifically recorded from there or Blackheath in Grinling, although Lewisham is mentioned. A.A. Allen informed Chalmers-Hunt (1960–81) that this species was 'very fond of hiding under bark' at Blackheath. On 7 August 1948, JFB found an imago at Blackheath. Much more recently in Greenwich Park, THF caught at m.v. light one on 22 July and two on 4 September 2004.

Mormo maura (Linnaeus) **L** OLD LADY

Reported by Tutt in Grinling to be occasional at Westcombe Park and to have been found in the Lewisham district by R. Adkin. A.A. Allen informed Chalmers-Hunt (1960-1981) in April 1960 that he encountered it sporadically at Blackheath in the 1920s and very occasionally thereafter, but not in the last decade. Although JFB never came across this moth at Blackheath or in Greenwich Park in the late 1940s he did find them in the porch of his home in nearby Charlton, but K. H. Hyatt recorded it at Blackheath on 5 August 1951, 11 and 17 September 1952 and 29 August 1957. On 4 September 2004, THF trapped one at the Bird Sanctuary site in Greenwich Park.

Dypterygia scabriuscula (Linnaeus) **L** BIRD'S WING
Edwards included this species in his Greenwich Park list and it was reported from Blackheath by West. According to Tutt (in Grinling) it was abundant at Westcombe Park, Lewisham, etc. in the early 1900s. The only more-recent records of which we are aware is an imago found by A.A. Allen resting on a birch tree trunk in Greenwich Park on 21 July 1956, three recorded by him at m.v. light at Blackheath in 1960, and another trapped by THF at the Park's Observatory on 6 July 2004. In the late 1940s D.F. Owen (pers. comm.) captured imagines close to Blackheath at Lewisham and JFB caught one at light at his nearby Charlton home on 29 July 1947.

Rusina ferruginea (Esper) BROWN RUSTIC
The only record from the area is of a moth trapped by THF at m.v. light in Greenwich Park's Bird Sanctuary on 7 June 2004.

Thalpophila matura (Hufnagel) STRAW UNDERWING
Included by Edwards in his Greenwich Park list and also reported from Greenwich by Buckell and Prout (1898–1901). K. H. Hyatt caught single specimens at light at Blackheath on 2 August 1957 and 5 August 1958. THF trapped the following at m.v. light in Greenwich Park: three on 4 September 2004, and two on 12 August 2005.

Euplexia lucipara (Linnaeus) SMALL ANGLE SHADES
Included by Edwards in his Greenwich Park list and reported from Blackheath, Westcombe Park and Lewisham in Grinling. West, reporting its occurrence at Blackheath, mentioned that the larvae are 'very fond of fern'. On 10 June 1947, D.F. Owen (pers.comm.) caught an imago on a bomb-site on the Lewisham side of Blackheath and on 26 June 1947 a female in the same spot which laid sixty eggs. On 10 July 1947, JFB found an imago on a fence on the Kidbrooke edge of Blackheath and caught another at light in his home at nearby Charlton on 29 July 1948.

Phlogophora meticulosa (Linnaeus) ANGLE SHADES
Also included by Edwards in Greenwich Park list and reported from Blackheath, Westcombe Park, Greenwich and the Lewisham district in Grinling, where it is described as generally distributed and numerous. JFB, K.H. Hyatt and D.F. Owen found it still numerous in the district in the late 1940s and early 1950s, finding imagines at Blackheath and in Greenwich Park. In the present decade, THF trapped the following in Greenwich Park at m.v. light: seven on 17 May, one on 7 June, and one on 4 September 2004; one on 12 August 2005.

Ipimorpha subtusa (Denis & Schiffermüller) **L** OLIVE
Reported by Tutt (in Grinling 1909) to have been not uncommon in the larval stage at Blackheath, Westcombe Park and Lewisham. No further records.

Parastichtis suspecta (Hübner) **L** SUSPECTED
On 1 August 1960, A.A. Allen caught an imago of this very local and scarce species in the London Area at m.v. light at Blackheath (Chalmers-Hunt 1960–81).

Parastichtis ypsillon (Denis & Schiffermüller) **L** DINGY SHEARS
Reported from Blackheath Park by West who found 'a colony' of larvae at the roots of poplars, which 'fed up well and emerged freely'. He also stated that the imagines 'abounded at dusk on Greenwich Marshes, flying around the willows'. Several were also reported by A.H. Jones in the latter locality on 15 July 1861, and A.A. Allen attracted one to m.v. light at Blackheath in 1959 (Chalmers-Hunt 1960–81). More recently, one imago was recorded by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

Cosmia affinis (Linnaeus) **L** LESSER-SPOTTED PINION
Reported from the Greenwich and Lewisham districts in Grinling. In 1959, A.A. Allen attracted imagines to m.v. light at Blackheath, but stated that they were not numerous (Chalmers-Hunt 1960–81). No further records.

Cosmia diffinis (Linnaeus) **pRDB** WHITE-SPOTTED PINION
Now considered possibly extinct in the London Area because of the great loss of elms from Dutch elm disease in the 1970s (Plant 1993), it used to be found in Greenwich Park (Edwards) and in the Greenwich district generally (Grinling). However, JFB and his companions never came across it in the late 1940s and in the 1950s.

Cosmia trapezina (Linnaeus) DUN-BAR

Reported from Greenwich Park by Edwards in Webster and described in Grinling as generally distributed and abundant in the SE London area, being specifically reported from Westcombe Park and the Greenwich district. A.A. Allen (Chalmers-Hunt 1960–81), presumably referring to the 1950s, stated that the larvae were common on lime trees at Blackheath. However, as with the last species, JFB and his companions did not come across it in the late 1940s and 1950s, although they found it plentifully at nearby Shooters Hill (Burton 1992). In the present decade THF recorded the following at m.v. light in Greenwich Park: three on 6 July, and 31 on 27 July 2004; four on 23 June 2005.

Cosmia pyralina (Denis & Schiffermüller) **L** LUNAR-SPOTTED PINION

Listed for Greenwich Park by Edwards in 1902. No other records.

Apamea monoglypha (Hufnagel) DARK ARCHES

Reported from Greenwich Park by Edwards and in Grinling from Blackheath and Greenwich, being described as common in the early 1900s. Seemingly less common in the late 1940s and 1950s, but recorded by D.F. Owen (pers. comm.), among other places, from the former bomb-site near the Hare and Billet Pond at Blackheath in August 1951. However, numerous in the present decade, judging by the following numbers recorded by THF at m.v. light in Greenwich Park: one on 7 June, 13 on 6 July, and 25 on 22 July 2004; 11 on 23 June, and four on 12 August 2005.

Apamea lithoxylaea (Denis & Schiffermüller) LIGHT ARCHES

Also reported from Greenwich Park by Edwards and in Grinling from Blackheath and Greenwich, and still fairly plentiful there in the late 1940s and the 1950s. On 23 June 2005, THF caught one at m.v. light at the Bird Sanctuary site in Greenwich Park.

Apamea crenata (Hufnagel) CLOUDED-BORDERED BRINDLE

Included by Edwards in his Greenwich Park list and reported by Tutt in Grinling from 'Westcombe Park, etc.' No other, more-recent records.

Apamea epomidion (Haworth) CLOUDED BRINDLE

Described by Tutt (in Grinling) as local, but reported by him from Westcombe Park. At Blackheath in reporting his capture of this moth at m.v. light in 1959, A.A. Allen described it as rare (Chalmers-Hunt 1960–81)

Apamea remissa (Hübner) DUSKY BROCADE

Not recorded in Greenwich Park by Edwards, but reported in Grinling by West from Greenwich, Fenn from Blackheath, and Tutt from Westcombe Park. The only record of which we are aware since then is of one attracted by THF to m.v. light at the Bird Sanctuary site in Greenwich Park on 23 June 2005.

Apamea unaminis (Hübner) SMALL CLOUDED BRINDLE

Descibed by Tutt (in Grinling) as rare but reported by him from Greenwich and Westcombe Park. No later records.

Apamea anceps (Denis & Schiffermüller) **L** LARGE NUTMEG

Reported by West from Blackheath and described in Grinling as formerly generally distributed in SE London, but now rare. No other records.

Apamea sordens (Hufnagel) RUSTIC SHOULDER-KNOT

Included by Edwards in his Greenwich Park list (1902) and reported by Tutt in Grinling as abundant at Greenwich and Westcombe Park. No recent reports.

Apamea ophiogramma (Esper) DOUBLE LOBED

Included by Edwards in his Greenwich Park list and described by Tutt in Grinling as very local in the SE London area but occurring, especially as larvae on ribbon-grass (reed canary-grass *Phalaris arundinacea)* in gardens, at Greenwich, Westcombe Park and Blackheath. No later reports.

Oligia strigilis (Linnaeus) MARBLED MINOR

Reported from Greenwich Park by Edwards and as abundant at Greenwich, Westcombe Park and in all SE London suburbs by Tutt in Grinling, also by West. From then up to the present decade, we were unaware of any more-recent records until THF caught the following at m.v. light in Greenwich Park: two on 7 June, and one on 6 July 2004; eight on 23 June 2005.

Oligia latruncula (Denis & Schiffermüller) TAWNY MARBLED MINOR

Described in Plant (1993) as a 'widespread and evidently abundant resident' in all parts of the London Area, we were unaware of any records in this area until THF recorded the following at m.v. light in Greenwich Park: two on 7 June 2004, and 15 on 23 June 2005.

Oligia fasciuncula (Haworth) MIDDLE-BARRED MINOR
Included by Edwards in his Greenwich Park list and reported from Greenwich by West and from Westcombe Park by Tutt in Grinling. Not recorded again until THF operated m.v. traps in Greenwich Park trapping single moths in the Bird Sanctuary on 7 June 2004 and 23 June 2005.

Mesoligia furuncula (Denis & Schiffermüller) CLOAKED MINOR
Not listed by Edwards, but reported in Grinling as abundant at Greenwich (West) and at Westcombe Park (Tutt). A. A. Allen found it to be numerous at m.v. light in his Blackheath Park garden in 1959 (Chalmers-Hunt 1960–81). But it was not reported again in the area until THF operated m.v. traps in Greenwich Park with the following results: one on 22 July 2004; one on 23 June and four on 12 August 2005.

Mesoligia literosa (Haworth) ROSY MINOR
Reported from Greenwich Marshes in the early 1860s by Fenn (Chalmers-Hunt 1960–81) and Greenwich (probably the Marshes) in Buckell and Prout (1898–1901). One imago was found at Blackheath by A.R. Kidner on 16 August 1906 and several were attracted to m.v. light there by A. A. Allen in 1959 (Chalmers-Hunt 1960–81).

Mesapamea secalis (Linnaeus) COMMON RUSTIC
As the existence of more than one species of *Mesapamea* was not recognized until 1983 (Plant 1993), all the records for this area being prior to that date were ascribed to *secalis*. Edwards included *secalis* in his Greenwich Park list and it was stated by Tutt (in Grinling) to be abundant at Greenwich, Westcombe Park, etc. Until the present decade, the only more-recent reports of *secalis* of which we knew was the capture by D.F. Owen (pers.comm.) of one at a bomb-site on the Lewisham side of Blackheath on 26 June 1947, and single specimens at Blackheath by K. H. Hyatt on 9 July and 2 August 1952 and 17 July and 3 August 1957. On 6 July 2004, THF captured two at m.v. light in Greenwich Park's Bird Sanctuary (confirmed by dissection).

Mesapamea secalis/didyma agg. COMMON/LESSER COMMON RUSTIC
The lesser common rustic (*Mesapamea didyma*) was not recognized until 1983. During his survey of Greenwich Park, THF recorded 27 undetermined *Mesapamea* spp. at m.v. light, most probably comprising both *M. secalis* and *M. didyma*. 12 were taken on 22 July 2004, and 16 on 12 August 2005.

Photedes minima (Haworth) SMALL DOTTED BUFF
The only records from this area of which we are aware concern the imago reported from Blackheath by A.A. Allen in 1959 (Chalmers-Hunt 1960–81) and one captured by THF caught at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004.

Eremobia ochroleuca (Denis & Schiffermüller) DUSKY SALLOW
The only record from this area of which we are aware is of one captured by THF at m.v. light in Greenwich Park's Bird Sanctuary on 22 July 2004.

Luperina testacea (Denis & Schiffermüller) FLOUNCED RUSTIC
Reported from Greenwich Park by Edwards and from 'Westcombe Park, Greenwich, etc.' by Tutt (in Grinling), and from Blackheath by West. Despite its wide distribution and general abundance in the London Area, we were unaware of any later records until 4 September 2004 when THF caught one at m.v. light in Greenwich Park's Bird Sanctuary.

Amphipoea fucosa (Freyer) ssp. *paludis* (Tutt) **L** SALTERN EAR
The only reports of this salt-marsh species are of one at Blackheath in 1958 and another two there in 1959 (Chalmers-Hunt 1960–81, Plant 1993). They presumably strayed from the Thames marshes.

Amphipoea oculea (Linnaeus) EAR MOTH
Reported from Greenwich Park by Edwards and from Greenwich and Westcombe Park by Tutt (Grinling 1909). Fenn recorded them as present 'in hundreds' in the district on 27 July 1861 (Chalmers-Hunt 1960–81). Our only recent records are of singletons captured at m.v light by THF at the Observatory site in Greenwich Park on 22 July 2004, and 12 August 2005.

Hydraecia micacea (Esper) ROSY RUSTIC
Larvae and pupae reported by West to be very common in burdock stems on Greenwich Marshes and all stages by Tutt (Grinling) to be very common on waste ground at Westcombe Park; also reported in Grinling from the Lewisham district (R. Adkin and C. Fenn). On the 26 September 1948, JFB found an imago in an old spider's web in a window of a hut at the eastern edge of Blackheath.

Rhizedra lutosa (Hübner) LARGE WAINSCOT

The only record of which we are aware is of an imago captured by K. H. Hyatt at Blackheath on 25 October 1949 (de Worms 1953–58, Chalmers-Hunt 1960–81).

Charanyca trigrammica (Hufnagel) TREBLE LINES

Reported from Blackheath and adjacent Kidbrooke by West in Grinling. A. A. Allen informed Chalmers-Hunt (1960–81) that in about 1926 he saw one of these moths in Greenwich Park 'hovering for some time at flowers in a flower-bed in the afternoon sun'. Since then our only record is of one moth trapped by THF at m.v. light in the Bird Sanctuary, Greenwich Park on 7 June 2004.

Hoplodrina alsines (Brahm) UNCERTAIN

Reported in Grinling from Westcombe Park and Greenwich (Tutt), and from Blackheath (West). We are unaware of any other records before THF trapped the following in Greenwich Park: six on 6 July, and five on 22 July 2004; four on 23 June, and four on 12 August 2005.

Hoplodrina blanda (Denis & Schiffermüller) RUSTIC

Described as local in Grinling and reported there from Blackheath (West) and Greenwich (Tutt). We are unaware of any later reports before 2004 when, at m.v. light in Greenwich Park, THF recorded 16 on 22 July 2004, followed by three on 23 June 2005.

Hoplodrina ambigua (Denis & Schiffermüller) VINE'S RUSTIC

This species began colonising England in 1899 and, apart from an imago recorded at West Wickham in Kent, did not reach the London Area until 1950, appearing in nearby Abbey Wood in 1953 (Plant 1993). Our first records for the Blackheath/Greenwich area were the following recorded at m.v. light by THF in Greenwich Park: two on 6 July, and 31 on 4 September 2004; five on 23 June, and four on 12 August 2005. This species is now common here as in the London Area as a whole.

Spodoptera exigua (Hübner) SMALL MOTTLED WILLOW

The only reports of which we are aware of this rare immigrant species in the area concern one on 8 July 1884 and another on 21 September the same year, both at Greenwich (Chalmers-Hunt 1960–81).

Caradrina morpheus (Hufnagel) MOTTLED RUSTIC

Reported from Greenwich Park by Edwards and by Tutt (in Grinling) from Greenwich, Westcombe Park and Blackheath. The latter mentioned (Chalmers-Hunt 1960–81) obtaining two examples of the aberration *obscura* Tutt at Westcombe Park in 1886 as well as several of the typical form in 1892–93. Until 2004 there were no other reports until THF operated m.v. traps in Greenwich Park and caught single moths at the Bird Sanctuary and Observatory sites on 6 July that year.

Paradrina clavipalpis (Scopoli) PALE MOTTLED WILLOW

Like the previous species, reported from Greenwich Park by Edwards and from Greenwich, Westcombe Park and Blackheath in Grinling. K. H. Hyatt collected a specimen at Blackheath on 24 September 1952 and further single specimens there on 4 July 1953 and 29 August 1958. In 1957, A.A. Allen (*Ent. Rec.* **69**: 245, Chalmers-Hunt 1960–81) recorded one on the early date of 20 February. THF's Greenwich Park survey of 2004–2006 produced the following records at m.v. light: four on 17 May, singles on 7 June and 6 July, and three each on 22 July and 4 September; 2005: seven on 23 June and two on 12 August. Observatory: 2004: three on 17 May, one on 7 June, two on 22 July and four on 4 September; 2005: four on 23 June and five on 12 August.

Panemeria tenebrata (Scopoli) **L** SMALL YELLOW UNDERWING

A.A. Allen in Chalmers-Hunt (1960–81) recalled seeing an imago in a grassy lane at Blackheath about 1933. No other records.

Pyrrhia umbra (Hufnagel) **L** BORDERED SALLOW

The only record is of one at m.v. light at Blackheath Park on the night of 4–5 July 1969 (Allen 1970*a*, Chalmers-Hunt 1960–81).

Heliothis peltigera (Denis & Schiffermüller) BORDERED STRAW

There is one record in the area of this irregular immigrant to Britain: an imago reported by S. Edwards from Blackheath in 1924, although another was found by Fenn as near Blackheath as Lee on 4 June 1894 (Chalmers-Hunt 1960–81, Plant 1993).

Protodeltote pygarga (Hufnagel) MARBLED WHITE SPOT

The only record we know of this species in the area is A.A. Allen's capture of one at m.v. light at Blackheath on 11 May 1959 (Chalmers-Hunt 1960–81).

Earias clorana (Linnaeus) **Nb** CREAM-BORDERED GREEN PEA

D.F. Owen (pers. comm.) found 'a fair number' of imagines of this moth on willows on Blackheath in 1946, but failed to find any in 1947. K.H. Hyatt also found one on a willow trunk there on 5 June 1946. In 1959, A.A. Allen recorded two at m.v. light at Blackheath (Chalmers-Hunt 1960–81). Otherwise the only other reports are old ones in Grinling from nearby localities such as Greenwich Marshes (C. Fenn, 9 June 1864), Lee and, up to 1897, Lewisham. This species was recently recorded in good numbers at Greenwich Peninsula Ecology Park during a survey there by THF in 2009.

Bena bicolorana (Fuessly) **L** SCARCE SILVER-LINES

Our only record prior to 2004 is of a three-quarters grown larva found by J.E. Owen climbing up the trunk of an oak in Greenwich Park on 28 April 1948 (D.F. Owen pers.comm.). Using m.v light traps, THF caught single moths in Greenwich Park on 22 July 2004, 23 June 2005, and 4 July 2008.

Nycteola revayana (Scopoli) **L** OAK NYCTEOLINE

The only reports of this species from our area of which we are aware, are all from Greenwich Park; captured at m.v. light by THF: one on 17 May, two on 6 July, two on 22 July, and one on 4 September 2004; two on 23 June, and one on 12 August 2005.

Diachrysia chrysitis (Linnaeus) BURNISHED BRASS

Reported from Greenwich Park by Edwards (Webster 1902), from Greenwich by R. Adkin and from Westcombe Park by Tutt (Grinling). No later reports.

Polychrysia moneta (Fabricius) GOLDEN PLUSIA

This species began colonizing England from the European mainland from 1890 and by 1907 was described by Tutt (in Grinling) to be 'now generally distributed' and was reported by him from Westcombe Park and Lewisham. No subsequent records.

[*Plusia festucae* (Linnaeus) GOLD SPOT

No records from the Greenwich and Blackheath districts, apart from a pre-1970 dot on the distribution map in Plant (1993), which probably refers to the early nineteenth century reports of its occurrence near Greenwich by J.F. Stephens and on Greenwich Marshes by A.H. Jones (Chalmers-Hunt 1960–81).]

Autographa gamma (Linnaeus) SILVER Y

This well-known and usually numerous immigrant was regularly recorded in the past in this area, including Greenwich Park, where it was listed in 1902 by Edwards. JFB, K.H. Hyatt and D.F. Owen recorded it in good numbers every year at Blackheath and in Greenwich Park in the late 1940s and early 1950s. On the evening of 19 September 1947, Owen (pers.comm.) estimated 'at least a hundred' present at the large former bomb-site opposite the Prince of Wales Pond on Blackheath. A pupa found at Blackheath on 15 April 1950 from which a moth emerged on 9 May 1950 suggests a case of successful overwintering (Chalmers-Hunt 1960–81). A. A. Allen (1967) reported that *gamma* was especially abundant at Blackheath in 1966. That it continues to appear in the area in good immigration years is evident from the following results of THF's m.v. light trapping and observations in Greenwich Park: one on 7 June, one on 6 July, three on 22 July, and three on 4 September 2004; one on 23 June, and two on 12 August 2005. Daytime searching in 2004 produced one at the Reservoir on 22 July and five there on 14 August, and three at One Tree Hill also on 14 August. Several were seen at the latter site on 5 September 2005.

Abrostola triplasia (Linnaeus) DARK SPECTACLE

In the past this species was described by Tutt (Grinling 1909) as local and was reported from Westcombe Park and the Lewisham district. A. A. Allen caught single moths at m.v. light at Blackheath on 5 June and 11 August in 1959 (Chalmers-Hunt 1960–81), but since then there appear to have been no records in the SE London area, and Plant (1993) described it as an extremely local and extremely rare resident in the London Area. Incidentally, the latter seems to have excluded JFB's capture of an undoubted specimen at Dartford Marshes, NW Kent, on 8 June 1952, published in de Worms (1953–58), presumably because he considered that it might have been confused with the spectacle *A. triplasia*. This was definitely not the case. JFB's specimen was eventually passed on to the late Dr D.F. Owen.

Abrostola tripartita (Hufnagel) SPECTACLE

This species was described by Fenn and Grinling as formerly common in the Lewisham district, now extinct, but gave no precise indication of its occurrence in the Blackheath district. However, in 1959, A. A. Allen described it as 'fairly rare at m.v. light' at Blackheath (Chalmers-Hunt 1960–81). Plant (1993) assessed its status at that date as a widespread and very common resident in all parts of the London Area. Nevertheless, our only record of it since 1959 is the moth trapped by THF at m.v. light at the Observatory site in Greenwich Park on 12 August 2005.

Catocala nupta (Linnaeus) RED UNDERWING
Included by Edwards in his Greenwich Park list for Webster. Tutt (Grinling) described it as abundant at Blackheath and Westcombe Park and often seen on fences. In the late 1940s and early 1950s, JFB does not recall K.H. Hyatt, D.F. Owen, J.E. Owen and himself finding any imagines on fences, but they frequently discovered them on the trunks of horse chestnuts, limes, poplars, oaks and willows, often up to thirty feet or so above ground, at Blackheath and in Greenwich Park. On 3 June 1947, J.E. Owen and a friend found three larvae between ten and sixteen feet above ground on poplar trunks in St Stephen's churchyard (D.F. Owen, pers.comm.).

Catocala sponsa (Linnaeus) **RDB2** DARK CRIMSON UNDERWING
The only record is of one 'at sugar in a wood near Blackheath on 1 September 1887' (Grinling 1909, Plant 1993).

[*Callistege mi* (Clerck) MOTHER SHIPTON
We are unaware of any specific records of this moth from either Blackheath or Greenwich Park, but A. H. Jones (Grinling) reported it from nearby Charlton where, half a century later, JFB caught one on Plum Pudding Hill, adjacent to Maryon Park, on 25 May 1946.]

Euclidia glyphica (Linnaeus) BURNET COMPANION
The only records of which we are aware are A.A. Allen's sighting of one in his garden at Blackheath about 1953, plus occasional imagines subsequently (Allen 1967). More recently, one seen by THF at the Reservoir in Greenwich Park on 8 June 2004.

Lygephila pastinum (Treitschke) **L** BLACKNECK
The only record is of an imago captured by THF at m.v. light at the Bird Sanctuary site in Greenwich Park on 6 July 2004.

Scoliopteryx libatrix (Linnaeus) HERALD
Listed for Greenwich Park by Edwards in 1902 and described by Tutt (Grinling) as generally distributed and reported from Westcombe Park and Lewisham. We are unaware of any records since then from the Blackheath area, although in late July 1946 JFB found a larva on willow at Charlton Sandpit and imagines in the other neighbouring districts of Kidbrooke (28 September 1947) and Lee Green (29 September 1947). One was recorded at m.v. light by THF at the Bird Sanctuary site in Greenwich Park on 4 July 2008.

Rivula sericealis (Scopoli) STRAW DOT
We have no record of the occurrence of this species in the area apart from the following captured by THF at m.v. light in Greenwich Park: one on 7 June 2004; three on 23 June, and two on 12 August 2005.

Parascotia fuliginaria (Linnaeus) **Nb** WAVED BLACK
Chalmers-Hunt (1960–81) gave the following records from Lewisham which may concern the Blackheath part of that borough: 1 August 1881, a female and two vacated cocoons in a cellar (two females taken subsequently were assumed to have originated from these cocoons); one bred in 1882; two females in the Dale Collection, one of which is dated August 1886. He also lists one as 'Blackheath, Stevens', apparently recorded in 1895 or 1896.

Hypena proboscidalis (Linnaeus) SNOUT
Reported by Tutt (in Grinling) to be generally distributed and recorded from Blackheath and Westcombe Park, it was not however listed by Edwards for Greenwich Park. At Blackheath, A.A. Allen reported it to be 'rare and very local among nettles' in the 1950s (Chalmers-Hunt 1960–81). We are unaware of any other records since then until 2004 when THF captured the following at m.v. light in Greenwich Park: six on 4 September 2004, three on 23 June 2005, and 10 on 4 July 2008.

Hypena rostralis (Linnaeus) **Nb** BUTTONED SNOUT
Again not listed for Greenwich Park by Edwards, but this nowadays apparently declining species was described by Tutt (in Grinling) as 'common throughout' the SE London area and reported from Blackheath, Westcombe Park and Greenwich. On 8 June 1947, JFB found a faded imago at Charlton, close to Blackheath, In April 1960, A.A. Allen reported to Chalmers-Hunt (1960–81) that he 'occasionally netted (imagines) after dark' in his garden at Blackheath Park and in a nearby lane, and that

he had captured one at light about 1949, but 'not so far at m.v. light'. Much more recently, THF recorded two specimens in Greenwich Park at m.v. light on 17 May 2004, one each at the Bird Sanctuary and the Observatory. Although hop (the larval hostplant) is absent from the Park, extensive searching by the late Alan Mills discovered it growing nearby at Halstow Road and Maidenstone Hill.

Zanclognatha tarsipennalis (Treitschke) FAN-FOOT
Reported by Tutt (in Grinling) to occur throughout the SE London area and mentioning its occurrence in gardens at Westcombe Park. No later records.

Herminia grisealis (Denis & Schiffermüller) SMALL FAN-FOOT
A. A. Allen reported to Chalmers-Hunt (1960–81) that this moth was not uncommon amongst brambles, etc. in his garden at Blackheath Park. Since then THF trapped four moths at m.v. light in Greenwich Park's Bird Sanctuary on 23 June 2005.

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POSTSCRIPT

It is to be hoped that any environmental damage resulting from the plans to hold the cross-country equestrian events of the 2012 London Olympic Games in Greenwich Park, with their attendant large crowds of spectators, will be kept to an absolute minimum, particularly in regard to those areas which are valuable because of their wildlife interest, such as One Tree Hill. To this effect, ecological surveys are being carried out in specific areas of the Park's grassland prior to any action being undertaken.

London butterfly monitoring report for 2008

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Abstract

Butterflies were monitored at twenty-three sites in London during 2008 by the transect walks method. Collated indices for species were calculated using the monitored data in comparison with previous years. Species accounts were supplemented by records from other surveys and observations.

Introduction

Monitoring of butterflies was undertaken by a standard method at sites in London in 2008. These provided data for the calculation of collated indices of changes in the abundance of butterfly species in London as compared with previous years. London is defined for the purposes of this paper as Greater London or the area encompassed by the London boroughs. Additional records from the wider London Natural History Society (LNHS) recording area are noted and/or made available to other datasets. For an overview of changes in the distribution and abundance of butterflies within the London area in the two decades since the work of Plant (1987), see Fox and Williams (2006).

Methods

Monitoring was undertaken by the transect walk method, a standard method adopted throughout the United Kingdom. Details of the method are described elsewhere: see Pollard and Yates (1993), Williams (2000), and the UK Butterfly Monitoring Scheme at www.ukbms.org. Basically, at each site a walk was undertaken along the same route, each week, between April and September inclusive, within a standard range of weather conditions conducive to butterfly flight. Counts were made of the number of adult butterflies observed to provide a total for each species for the year at each transect. Totals used for this paper include calculated estimates for weeks missed due to poor weather or the unavailability of the recorders. However, for inclusion in the index, data from each transect needs to have been obtained with good coverage during the recording season and with the minimum of missed weeks. To contribute to the indices, data from each transect must be available for at least two years, though these do not need to be consecutive. Collated indices were calculated from the data as described by Williams (2000), but see also Crawford (1991) for an introduction to the use of collated indices in wildlife monitoring; and also Pollard and Yates (1993) and Roy and Rothery (2002). Note that neither the original site counts nor the collated indices are absolute counts of the population, but indices of abundance for each species over a number of years. Estimates of the relative changes in the populations of each species from year to year are given by the difference in the indices. For example, a species with an index of 50 in one year and 25 in the following year would have had approximately half the adult population in the second year as compared with the first year. Indices have been rounded to the nearest whole number and have usually been set at 100 in 1990 or the first year of record: for a technical discussion see Crawford (1991). Reliability of indices increases with the number of transects; in the earlier years these were relatively few, e.g. one transect was walked in 1978, two in 1986, three in 1988 and eight in 1990. Reliability of the indices may be lower for species with low counts and/or local distribution in London. The 'Total count on transects' provides an indication of the size of the count from which the analysis was made in 2008 using the data from the complete transects for that species, including estimated counts for missing weeks; but excluding the computed estimated counts for transects that were not walked or had insufficient data in 2008.

Transects that contributed data in 2008, the years for which data were available and the Borough in which the transect is located were: **Hampstead Heath** (Camden) 1978–2008, **Fryent Country Park** (Brent) 1986–2008, **Beane Hill** (Brent) 1988–2008, **Gutteridge Wood** (Hillingdon) 1990–2008, four transects managed by the Corporation of London (located in the London Borough of Croydon): **Coulsdon Common** 1990–2008, **Farthing Downs** 1990–2008, **Kenley Common** 1990–2008, **Riddlesdown** 1990–2008; **Mitcham Common 'route A'** (Merton) 1994–2001, 2003–2008, **Mitcham Common 'route B'** (Merton) 1995–2008, **Wildfowl and Wetlands Trust Wetland Centre at Barn Elms** (Richmond upon Thames) 1996–2008, **Railway Fields** (Haringey) 1997–2008, **Hutchinson's Bank Nature Reserve** (Croydon) (Figure 1) 1997–2008, **South Norwood Country Park** (Croydon/Bromley) 1998–2008, **Tower Hamlets Cemetery Park** (Tower Hamlets) 1999–2008, **Brent Reservoir** (Barnet/Brent) 2000–2008, **Regent's Canal towpath from Mile End Road to Mare Street** (Tower Hamlets/Hackney) 2001–2008, **Riddlesdown Quarry** (Croydon) 2001–2005, 2008, **Kenwood Estate** (Camden) 2005–2008, **Horsenden Hill East** (Ealing) 2005–2008, **Horsenden Hill West** (Ealing) 2005–2008, **Perivale Wood** (Ealing) 2005–2008, and **Farthing Downs New Hill** (Croydon) 2005–2008. Recorders for 2008 are listed in the Acknowledgements.

The indices have been updated with data from some sites for 2007 and earlier years that were not available at the time that the 2007 indices were prepared. Some results were available from **Cranford Park** (Hounslow) and from **Spring Park** (Bromley) but had too many missing weeks for inclusion in the 2008 indices. **Featherbed Lane Roadside Verge** (Croydon) was not walked in 2008 because the paths were overgrown. A new transect was established at **Bronzefield**, outside of the Greater London area but within the LNHS area. Records from these transects and from other observations by LNHS observers have been included in the species accounts where appropriate.

The London transects contribute towards the national indices of the UK Butterfly Monitoring Scheme and for results for the most recent year available, 2007, refer to Botham et al. (2008). Records also contribute towards the databases maintained for the wider LNHS area, for which reference should be made to the respective county reports produced by Butterfly Conservation (e.g. Murray and Wood 2008) and other teams.

Results

The order and nomenclature of the species accounts follow Asher et al. 2001. The species accounts are based on the collated indices, which for the years 1998 to 2008 are presented in Table 1. As some year-to-year variations are to be expected, the comments below are focused on the more pronounced changes or on longer-term trends.

Small skipper *Thymelicus sylvestris* and Essex skipper *Thymelicus lineola*

Small and the Essex skippers are often counted together by transect walkers due to the difficulty of separating these species in flight. They are species of rough grassland habitats. At thirteen transects attempts were made to identify some individuals to the two species separately. Of 173 skippers, 68 per cent (118) were identified as small skippers, and 32 per cent (55) as Essex skippers. Total count on transects: 1,356.

Large skipper *Ochlodes sylvanus*

The index was the lowest since transect monitoring commenced in London in 1978; and there is some evidence for a long-term decline in London. The large skipper is a species of grassland with scrub. Total count on transects: 171.

Dingy skipper *Erynnis tages*

Recorded at Hutchinson's Bank Nature Reserve. Total count on transects: 14.

Grizzled skipper *Pyrgus malvae*

Recorded at Hutchinson's Bank Nature Reserve. Total count on transects: 16.

Clouded yellow *Colias croceus*

Recorded at Farthing Downs New Hill, and Perivale Wood, with one on 10 May 2008 and the other records from mid August. Total count on transects: 5.

Brimstone *Gonepteryx rhamni*

The similar index to that of 2007 is collated from slightly lower counts at most sites but a considerably higher count at Tower Hamlets Cemetery Park. Planting of a larval food-plant, alder buckthorn *Frangula alnus*, continued at some sites in north London, particularly in Brent, and many of these trees should establish during the coming years. Elsewhere in London, Diane Andrews reported that a female brimstone found a solitary alder buckthorn growing in a pot at Wood Green N22 on 10 May 2008. Within a few days, 137 eggs had been laid with up to 15 on one leaf. The first caterpillars hatched on 22 May 2008; and up to 85 caterpillars were found within a few days, such that by 10 June 2008 the caterpillars had eaten practically all the leaves, so some of the caterpillars were transferred to an alder buckthorn at another site. The remaining caterpillars on the original plant were then lost, possibly to predation; but at the new site, two female brimstones emerged from pupation on 4 July 2008. Total count on transects: 460.

Large white *Pieris brassicae*

Following the relatively low index of 2007, numbers of the large white were higher at almost all transect sites in London. Total count on transects: 629.

Small white *Pieris rapae*

Recorded on all of the transects in 2008. Total count on transects: 1,528.

Green-veined white *Pieris napi*

The index was similar to that of 2007. Total count on transects: 768.

Orange tip *Anthocharis cardamines*

The orange tip has a preference for damp grassland. Total count on transects: 173.

Green hairstreak *Callophrys rubi* (Figure 2)

There were records from Farthing Downs New Hill and Mitcham Common Route A. Total count on transects: 13.

TABLE 1. Collated indices for butterfly species in London, 1998–2008. Indices have been rounded to the nearest whole number and have usually been set at 100 in 1990 or the first year of record, though indices may be set at 100 in other years or at a different figure where this aids interpretation. A blank indicates that the species had not yet been recorded on any transect in London. A zero indicates that a species was not observed on transects in that year but had previously been observed on a transect in London.

	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Small and Essex skippers	88	93	78	90	76	76	80	84	78	64	64
Large skipper	42	60	55	41	70	99	67	71	52	47	30
Dingy skipper	58	51	63	39	68	101	67	55	27	14	15
Grizzled skipper	25	63	28	16	48	41	81	21	26	44	67
Clouded yellow	109	0	2,255	0	75	121	107	0	554	27	86
Brimstone	85	75	117	91	91	79	111	117	100	71	74
Large white	274	117	124	107	173	113	139	164	147	71	118
Small white	162	89	132	116	148	167	245	200	181	183	151
Green-veined white	186	90	95	61	98	76	98	66	58	51	49
Orange tip	66	48	77	63	79	43	65	78	51	35	40
Green hairstreak	65	32	30	119	168	68	98	51	34	99	55
Purple hairstreak	310	297	336	228	382	232	343	573	415	391	515
White-letter hairstreak	32	10	10	21	12	14	10	39	54	12	15
Small copper	56	42	23	6	7	63	54	21	47	44	29
Small blue	225	175	188	446	235	50	74	149	463	288	210
Brown argus	9	10	16	6	15	30	30	13	33	23	14
Common blue	43	83	68	39	48	138	61	53	120	34	41
Chalkhill blue	75	180	90	85	39	38	38	89	130	10	3
Holly blue	66	37	43	51	41	42	61	69	39	69	63
White admiral	100	0	0	0	0	0	100	0	0	0	100
Purple emperor								100	0	0	0
Red admiral	140	127	261	192	206	423	132	165	378	394	145
Painted lady	7	10	62	8	71	384	37	3	209	32	4
Small tortoiseshell	185	153	73	45	25	66	143	54	28	12	5
Peacock	1,135	1,114	1,499	1,073	653	393	597	512	311	394	309
Comma	132	115	199	147	132	199	145	121	216	110	112
Dark green fritillary	148	181	63	7	11	91	9	4	0	0	0
Silver-washed fritillary	0	100	300	100	0	0	0	125	500	0	0
Speckled wood	141	162	176	148	205	230	141	147	129	122	188
Marbled white	61	54	40	14	19	37	26	14	37	33	60
Gatekeeper	103	145	158	140	134	171	217	265	213	168	164
Meadow brown	162	151	147	92	68	139	114	152	132	77	85
Ringlet	299	354	470	234	292	390	227	170	207	143	262
Small heath	16	3	2	1	1	8	6	9	10	11	8

PURPLE HAIRSTREAK *Neozephyrus quercus*

Recorded at Mitcham Common, Kenwood Estate, Brent Reservoir, Perivale Wood and Horsenden Hill West. Purple hairstreaks generally fly in the evening and were possibly more frequent and widespread than suggested by the daytime transects, particularly where there are oak trees and woodland with oak. Elsewhere in London there were records from Cranford Park, and at Duncan's Wood and other sites in the Enfield area. Total count on transects: 88.

WHITE-LETTER HAIRSTREAK *Satyrium w-album*

The majority of the transect count was from Horsdenden Hill West, with one record each from the nearby Horsenden Hill East and Perivale Wood transects. Elsewhere there was one record from Cranford Park and one at Trent Park. Beyond Greater London but within the LNHS recording area there was a record from Warren Farm beside Nonsuch Park, Epsom. Total count on transects: 10.

SMALL COPPER *Lycaena phlaeas*

Recorded on over half of the transects, the highest count was again at Mitcham Common route A. Total count on transects: 167.

SMALL BLUE *Cupido minimus*

All of the transect count was from Hutchinson's Bank Nature Reserve. Total count on transects: 17.

BROWN ARGUS *Aricia agestis*

Most transect records were from south London though a singleton was recorded at Horsenden Hill West, and there were non-transect records from Trent Park. Total count on transects: 20.

COMMON BLUE *Polyommatus icarus* (Figure 3)

The common blue was recorded on approximately two-thirds of the transects in 2008; and populations tended to coincide with specific grassland habitats. On the monitored sites in London, the common blue had relatively high populations at chalk downland sites but also at Tower Hamlets Cemetery Park and the London Wetland Centre at Barn Elms. Total count on transects: 538.

CHALKHILL BLUE *Polyommatus coridon*

The low index was a reflection of the decline in the count to zero at the Riddlesdown transect; a reason for which is not yet clear. The chalkhill blue was however recorded at the Riddlesdown Quarry transect. Total count on transects: 2.

HOLLY BLUE *Celastrina argiolus*

Widespread and recorded on most transects, numerically over half of the count was at Tower Hamlets Cemetery Park. Total count on transects: 417.

WHITE ADMIRAL *Limenitis camilla*

There was one record from the Horsenden Hill West transect. Total count on transects: 1.

RED ADMIRAL *Vanessa atalanta*

Widespread but with reduced numbers at almost all sites and the index was less than half that of 2007. Records were received for red admiral in flight for all months except March and November. Total count on transects: 111.

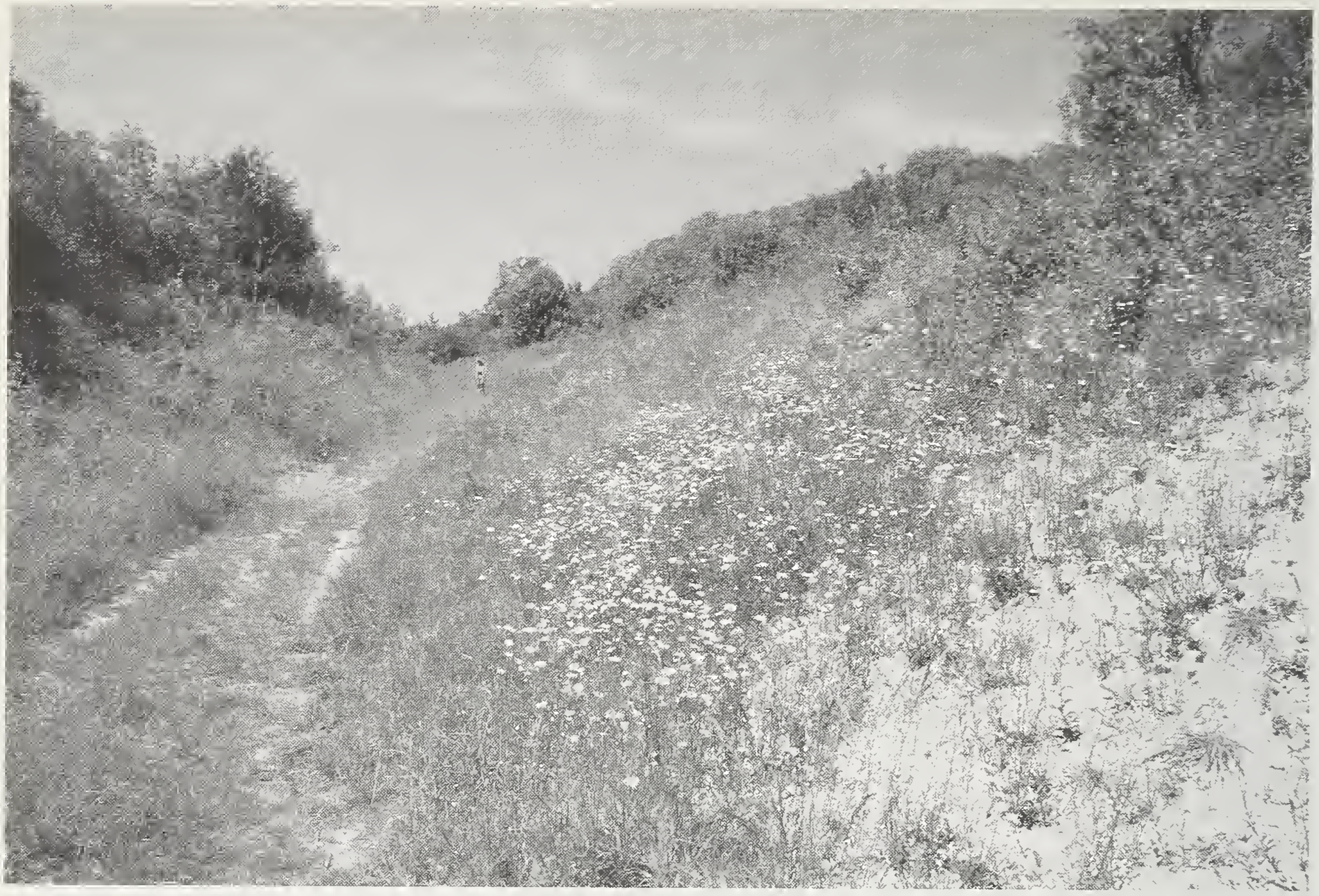

FIGURE 1. Hutchinson's Bank Nature Reserve – section 2, also known as the Cutting, of the butterfly monitoring transect. The small blue, dingy skipper, grizzled skipper and the occasional dark green fritillary can be seen along this section. *Photo: Martin Wills*

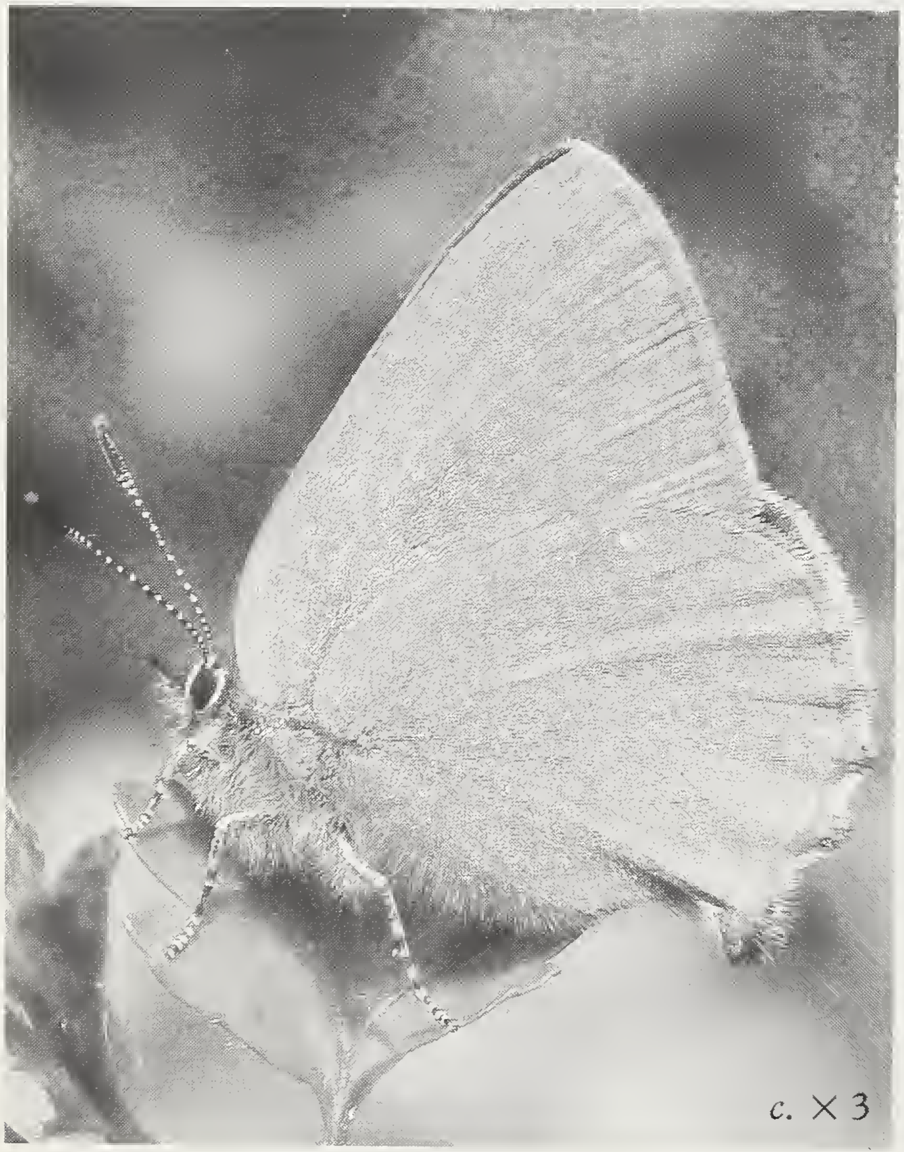

FIGURE 2. Green hairstreak at Hutchinson's Bank Nature Reserve where it is a species of young scrub. It uses the flowers of dogwood and of common bird's-foot trefoil as larval foodplants. *Photo: Martin Wills*

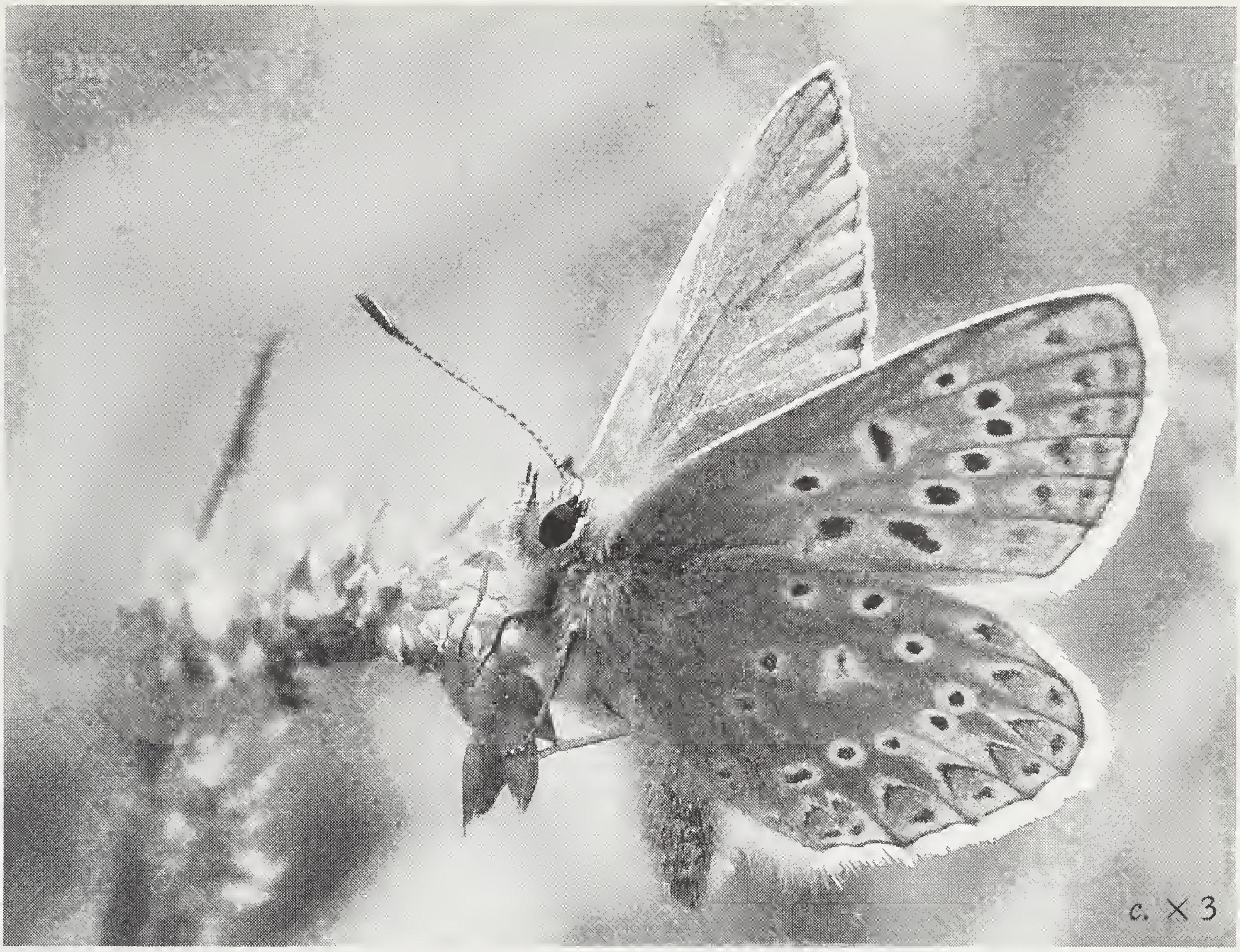

FIGURE 3. Common blue at Hutchinson's Bank Nature Reserve where it is found on all sections of the transect with grassland. *Photo: Martin Wills*

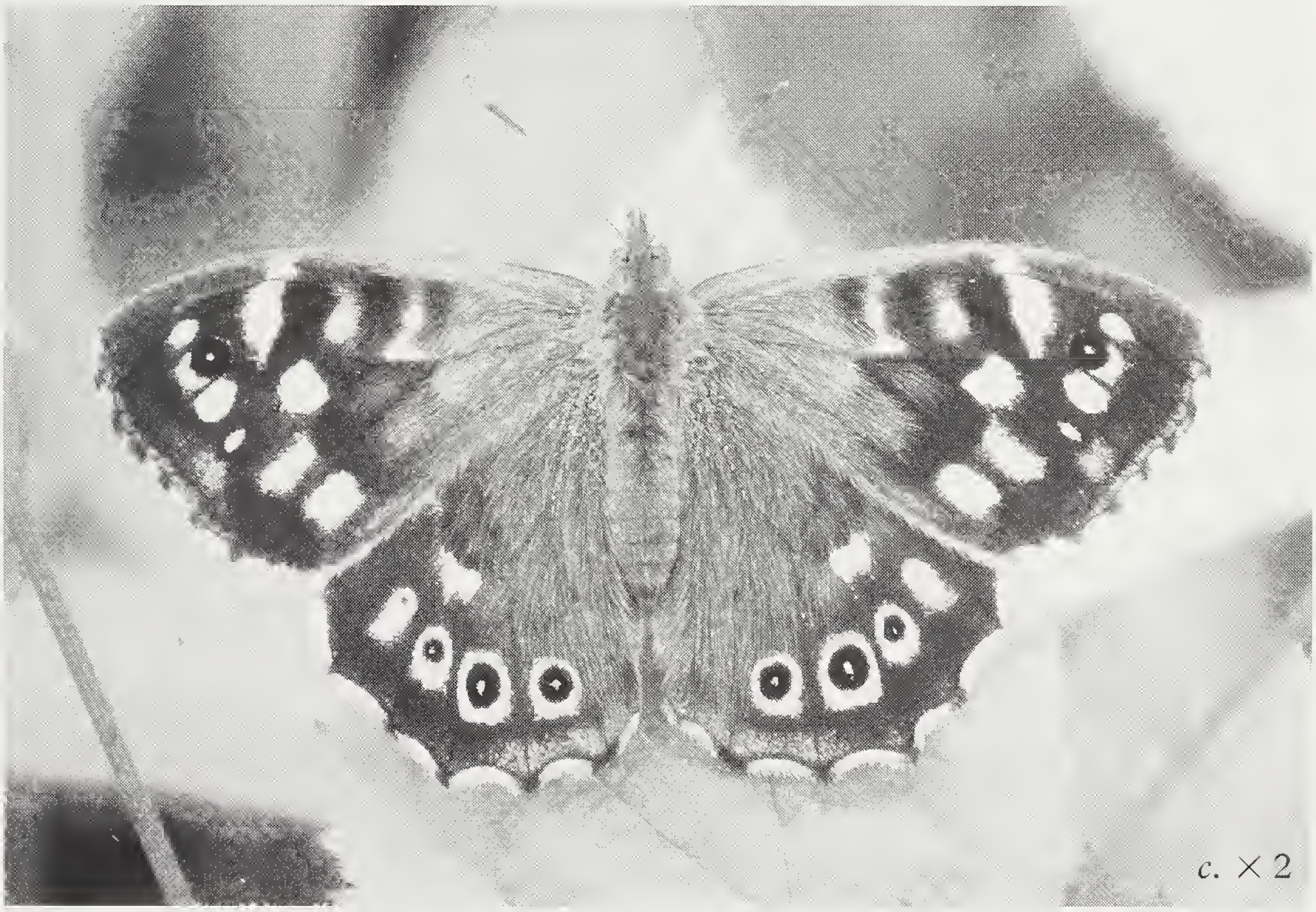

FIGURE 4. Speckled wood at Hutchinson's Bank Nature Reserve where it is a common butterfly in the shady areas on the transect. Where there are gaps in the canopy, the speckled wood is often seen chasing meadow browns and ringlets. *Photo: Martin Wills*

PAINTED LADY *Vanessa cardui*

In London, the population of this migrant varies considerably from year to year (Table 1). The year 2008 was one of relatively low numbers: the painted lady was recorded at only four transects, each with a singleton. Total count on transects: 4.

SMALL TORTOISESHELL *Aglais urticae*

The small tortoiseshell continued an apparent decline in London. The index was the lowest since transect monitoring commenced in London in 1978. The species was recorded at only nine of the 23 transects. The UK Butterfly Monitoring Scheme results for 2007 (Botham et al. 2008) noted that the small tortoiseshell had declined over much of the UK during the years 2004–2007. The arrival in the UK of the parasitic tachinid fly *Sturmia bella* is considered a factor; and of populations of the small tortoiseshell larval groups sampled in southern England in 2007, 30–40 per cent were affected by *S. bella* (Owen Lewis, quoted in Botham et al. 2008). However, numbers of the small tortoiseshell were known to fluctuate prior to the arrival of the parasite and weather is suggested as another factor. In 2008 approximately three quarters of the London records were of the spring flight (April to May) and the remainder of the summer generation (late June to late July). A similar pattern was observed by Robert Callf in Trent Park and surrounding areas, but with approximately a tenth of the records corresponding to each of the summer and late summer / autumn (September) generations. Total count on transects: 19.

PEACOCK *Inachis io*

Widespread in London, though the index was relatively low compared with the majority of years during the past decade. Total count on transects: 341.

COMMA *Polygonia c-album*

Widespread in London, and the index, similar to that for 2007, was relatively low compared with the majority of years during the past decade. Total count on transects: 286.

SILVER-WASHED FRITILLARY *Argynnis paphia*

Not recorded on the transects in 2008 and the only record was from inner London. Des McKenzie recorded one at 07.00 hours on 14 July 2008 in a children's play area at Adpar Street / Hall Place, Paddington Green, W2 before it flew in the direction of the nearby St Mary's churchyard. Total count on transects: 0.

SPECKLED WOOD *Pararge aegeria* (Figure 4)

The speckled wood was amongst the most widespread of butterflies in London. The index was higher than in 2007 and it is a species that often appears to have high numbers in years when other species appear to be affected by relatively overcast and wet weather. Total count on transects: 2,565.

MARBLED WHITE *Melanargia galathea*

Most of the transect count of the marbled white was from Hutchinson's Bank Nature Reserve, and then from the Brent Reservoir. Counts increased at both sites, and that at the Brent Reservoir was the highest since the transect monitoring commenced there in 2000. Marbled whites were recorded from eight other transects, particularly from sites on the southern edge of London but also from Gutteridge Wood, Mitcham Common route B, and Horsenden Hill East and West transects. The index was the highest since 1998. Total count on transects: 459.

GATEKEEPER *Pyronia tithonus*

Recorded on all but one of the transects, the index was similar to that of 2007 but lower than 2004–2006. Total count on transects: 2,380.

MEADOW BROWN *Maniola jurtina*

A species of grassland habitats, the meadow brown was recorded on all transects. The index was slightly higher than in 2007 but remained relatively low in comparison with the indices for the past decade. The count at Fryent Country Park transect was the lowest since transect monitoring commenced there in 1986, though the hay was harvested from the meadows for the first time for several years and that could benefit the meadow brown population in the future. Total count on transects: 7,185.

RINGLET *Aphantopus hyperantus*

The index for the ringlet increased from the relative low of 2007. It was recorded on each of the chalk downland transect sites on the southern edge of London; and on the two Mitcham Common transects. Elsewhere in London there were records from Trent Park. Total count on transects: 859.

SMALL HEATH *Coenonympha pamphilus*

In London, the small heath is a 'habitat specialist' rather than a 'wider countryside species', as described by Asher et al. (2001) and is confined to sites with quantities of fine-leaved grass foodplants. The large majority of the transect count was from the chalk downland site at Hutchinson's Bank Nature Reserve, with other records from Farthing Downs and Riddlesdown Quarry. Away from the chalk, there were records from the London Wetland Centre, Cranford Park and Trent Park. Total count on transects: 109.

Discussion

Preliminary national results for 2008 reported by Butterfly Conservation (in *Butterfly Magazine* 100, Spring 2009: 5), suggested that in 2008, the numbers of the large skipper were the lowest since national monitoring commenced in 1976 (London had the lowest index since monitoring commenced in 1978), and that the small tortoiseshell had declined by a further 40 per cent since 2007 (London had a decline of over 50 per cent though on a now small sample size). Nationally, the peacock was at the lowest since 1976, though London has had lower years.

There have been no records of wall brown *Lasiommata megera* on transects in London since 1995 and few other records; and the species has been removed from the list in Table 1. There were no records of the wall brown in Hertfordshire in 2007 (Murray and Wood 2008), the last record being in 2005. Nationally it declined substantially between 2005 and 2007 (Botham et al. 2008) and is now scarce in many inland counties.

Acknowledgements

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Beddard at the Brent Reservoir, Donald Rooum at Regent's Canal towpath, Mike Taylor at Kenwood, David Howdon, Andrew Culshaw and Martin Smith at the Horsenden Hill transects and at Perivale Wood, and Rob Solomon and Simon Braidman at Cranford Park. Records were also received from Diane Andrews, John Boorman, Robert M. Callf, Keith Chambers, Joan Lowe, Jovita Kaunang, Faith Keymer, Des McKenzie, and from London Natural History Society field meetings/LNHS *Newsletter*, and the Butterfly Conservation Hertfordshire and Middlesex Branch *Newsletter*. The support of the landowners and land managers of the transect and other sites are acknowledged, including a significant number of the London boroughs (see the Methods), the Corporation of London, other public authorities, the London Wildlife Trust, the Mitcham Common Conservators, the Friends of Tower Hamlets Cemetery Park, Barn Hill Conservation Group, and the Welsh Harp Conservation Group. The co-operation with the county coordinators for Butterfly Conservation is noted, particularly from Andrew Wood and John Murray for Hertfordshire and Middlesex. Dr Dave Dawson had previously advised on the statistical method for the collations and the programming of the spreadsheets. Simon Mercer helped develop the series of linked spreadsheets. I also thank Colin Plant and Caroline Williams.

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Cynthia Longfield's pioneering work on London's dragonflies, and her legacy

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Abstract

Cynthia Longfield's pioneering work on British dragonflies set the scene for serious studies in London from the 1940s, the birth of the British Dragonfly Society in 1983, and the subsequent wide appreciation of the role of Odonata in matters of conservation significance, especially in relation to habitat management. Two species, *Anax parthenope* and *Erythromma viridulum,* were first recorded in Britain in 1996 and 1999 respectively, and are now recorded in the London Area.

Introduction

During her long and active life, Cynthia Longfield (1896–1991) made a significant contribution to odonatology. She travelled the world collecting and studying insects, especially dragonflies, during the early part of the twentieth century, a time when this was particularly unusual for women (Hayter-Hames 1991, Hyatt 1992). Between 1927 and 1957 Cynthia worked as a volunteer at the British Museum (Natural History), as the Natural History Museum, London, was then known. At the BM(NH), in the company of Douglas Kimmins, she worked on the dragonfly collections, in particular on unravelling the tricky taxonomy of certain African genera. Cynthia is also well remembered for the encouragement she gave to younger dragonfly specialists in their work on both African and British Odonata (Gambles 1975, Corbet 1991*a, b*). In this country, she is perhaps best known for the ground-breaking guide to British dragonflies published in the Wayside and Woodland series (Longfield 1937, 1949*a*). This is the first recognizably modern field guide published on the British dragonflies and was influential in nurturing a new generation of British dragonfly enthusiasts. The book featured identification keys to adults, accompanied by detailed line drawings of adults and larvae, as well as information on distribution, flying season and habits. The information on dragonfly distribution inspired others to record dragonflies (Moore 2004) and soon Longfield was receiving records from a network of correspondents.

Cynthia Longfield used her contacts and first-hand knowledge of the best dragonfly localities in the London Area to good effect when she began compiling records of London's dragonflies. This culminated in the publication of the first account of the distribution of dragonflies in the capital and its immediate surroundings (Longfield 1949*b*). This paper provided an account of all thirty-two species then known from the LNHS recording area, of which twenty-seven were thought to be breeding. As well as contemporary records, the 1949 survey draws on records and collections of earlier entomologists from the nineteenth century.

The survey differs from what might be expected in a modern survey in several ways. No distribution maps are provided, but localities are listed for each species. Nevertheless, the precise location of some of the sites is rather vague. This may have been through fear of drawing the attention of collectors to sensitive sites, something which would not now be of great concern. Longfield mentions that she would not be 'giving anything away' when mentioning the Basingstoke Canal as an important site for rare species because

Cynthia Evelyn Longfield, 1896–1991

it was already so well known. In addition, there is no sense that a comprehensive survey was attempted; rather the focus is on localities already well known for dragonflies.

Cynthia Longfield's concerns for the conservation of dragonflies are apparent in her recognition that several of the sites that had supported dragonflies in the past had already been destroyed or were in decline by 1949. Several species that had been reported in the past, including *Ischnura pumilio*, *Libellula fulva* and *Leucorrhinia dubia*, had already become extinct in the London Area by the time of Longfield's survey. Longfield also recognized the threats to dragonfly sites posed by the over-zealous tidying of the London parks and the necessity of keeping the rivers in good condition. Longfield mentions, as breeding sites for dragonflies, the growing importance of flooded gravel pits, which were increasing in number as London expanded. She also pondered the suitability of bomb sites as dragonfly breeding locations. However, it is notable that she makes no mention of garden ponds, educational ponds or local nature reserves which today make a significant contribution to the conservation of dragonflies in inner London.

The great value of Cynthia Longfield's survey is that the modern distribution of London's dragonflies can be compared and contrasted with the earlier records, and the reasons for any changes can be considered. Between 1983 and 1988, SJB was the London Natural History Society's recorder for dragonflies. Thousands of dragonfly records were received from LNHS members and, following a media campaign, from interested members of the public. Many sites were visited throughout the LNHS recording area, including those mentioned by Longfield, as well as sites well-known for their natural history interest and sites gleaned from Ordnance Survey maps. The results were published in Brooks (1989), exactly forty years after Cynthia Longfield's account. In contrast to Longfield's original survey, the records were plotted as dot distribution maps on a tetrad (2-km square) basis and full details of the sites that supported important dragonfly assemblages were given. Records were received from observers from a wide spectrum of backgrounds, including many birdwatchers. This evident popularity and awareness of dragonflies is in contrast to Longfield's observation that dragonflies were a 'neglected group' (Longfield 1949*b*) and was probably a result of the availability of field guides to Odonata and the activities of the British Dragonfly Society (BDS), neither of which was present before 1980. The existence of both can be traced back directly to the influence of Cynthia Longfield herself. When SJB corresponded with Cynthia about updating her survey, true to form, she replied with lively and enthusiastic letters encouraging him in the enterprise. The results of the survey indicated that the distribution of many species had not significantly changed but several species, especially those confined to flowing water, had declined, probably due to deterioration of water quality and river management that was not sympathetic to the needs of aquatic insects. One species, *Brachytron pratense*, had become extinct.

The scene today

The world of dragonfly recording and general interest in Odonata has undergone seismic changes since the pioneering days of Cynthia Longfield. Now, far from being a neglected group of insects, they come a close second only to butterflies in terms of mass appeal. Certainly this growth in interest can partly be attributed to the wealth of available information. Today there are many good fieldguides (not just covering the UK, but from many areas of the globe), county faunas, site guides as well as volumes devoted to more in-depth biology and natural history of these insects, such as the recent publication in the New Naturalist series of a new volume on dragonflies (Corbet and Brooks 2008); a sequel to the earlier 1960 volume by Cynthia Longfield who had teamed up with Philip Corbet and Norman Moore (Corbet, Longfield and

Moore 1960). Also, there is now a wealth of easily accessible information on dragonfly identification and recent sightings on the worldwide web aided by the wonders of digital photography. The BDS website is a good example (www.dragonflysoc.org.uk).

Today, enthusiasts can choose various courses on which to study dragonflies, their larvae and habitats, such as those run by the Field Studies Council. The popularity of dragonflies these days has induced some wildlife tour operators to run trips to far-flung destinations to watch exotic species. Local natural history societies, such as the LNHS, have collated dragonfly records and organized field meetings to study Odonata. The Wildlife Trusts, the RSPB and the Wildfowl and Wetlands Trust (WWT) also organize dragonfly events on their reserves to create wider appeal by introducing these spectacular insects to a new non-specialist audience.

The formation in 1983 of the British Dragonfly Society has given the study of dragonflies a massive boost and this body collates all the distribution records in a national database (www.nbn.org.uk) and is the *tour de force* in the conservation of Odonata, advising NGOs, such as the RSPB, as well as government bodies, such as Natural England, on all matters of dragonfly conservation significance.

Since the 1970s the conservation movement has grown, resulting in improved legislation to protect vulnerable habitats, and the creation of many new nature reserves. Within the LNHS area, the creation of the first dragonfly reserve at Cornmill Meadows near Waltham Abbey in the Lea Valley is particularly noteworthy. Other notable new reserves are the WWT London Wetland Centre (LWC) in Barnes, which provides a range of wetland habitats for dragonflies a few miles from central London and, more recently, the acquisition of some of the Thames grazing marshes by the RSPB at Rainham in Essex plus Amwell Springs, Hertfordshire's top dragonfly site, which is now under management of Herts and Middlesex Wildlife Trust.

In tandem with the proliferation of new nature reserves has been the explosion in growth of gardening for wildlife, encouraged by the media, especially television. This has resulted in the creation of many more wildlife ponds in private gardens and in conservation areas in local parks, which benefit a variety of wildlife, including a range of dragonflies.

Looking at the Odonata fauna of the LNHS recording area, many of the species that were widespread in Cynthia's days, remain so. Some of the species that exhibited a southerly distribution in the UK have undergone dramatic northward advances in range, which may relate to climate change (Brooks et al. 2007). *Sympetrum sanguineum* is a species that has expanded nationally but has not changed in our local area very much, whereas *Aeshna mixta* has increased and is now one of our most familiar late-summer species. *Orthetrum cancellatum* is another species that is currently expanding northwards and westwards nationally and has also increased locally. Cynthia recorded it at a few sites close to our periphery whereas now it can be seen in large numbers close to central London, for example at the LWC. The species is also abundant at Cornmill Meadows following management to flood the meadows and create new pools.

The recolonization of a formerly extinct species in the LNHS area is good news. Most notable is the return of *Brachytron pratense* since the mid 1990s to parts of the Lea Valley, particularly around Cornmill Meadows, and to some ponds in Epping Forest. There have also been occasional sightings in recent years at sites to the west of London, such as LWC where there is suitable habitat for this species.

Some of the scarcer species in our area, such as *Cordulia aenea* and *Somatochora metallica*, are still holding their own without showing much sign of expansion. The nationally widespread, but scarce in eastern counties, *Sympetrum danae* can still be found at Wimbledon and Esher Commons, but appears to have declined at the former site due to a series of dry summers drying out the breeding ponds. *Aeshna juncea* has also not been recorded recently from there; any possible sightings always turning out to be *A. mixta*! *A. juncea* has always been a scarce species in London due to a lack of suitable habitat and some previous records are possibly misidentifications.

Lestes dryas is another species that has come back from the brink. It has specialist habitat requirements but following suitable management of dykes at Rainham by the RSPB its future there is looking more positive than a few years ago.

In addition to many species expanding their ranges at a national level over the last fifteen years or so, the other notable occurrence has been the arrival of new species that were previously unrecorded. Some of these new species have remained rare vagrants. Two new species have been recorded in our area. The first, *Anax parthenope* (Frontispiece), was first recorded in the UK in Gloucestershire in 1996 (Phillips 1997) and has since been recorded annually from sites around Britain, with confirmed breeding in some areas such as Cornwall. There have been at least three records in the LNHS area, with singles at LWC in 1999, Bedfords Park in 2003 and Lambeth Reservoirs in 2007.

The second new arrival, *Erythromma viridulum* (Frontispiece), has undergone one of the most dynamic colonizations of any insect in the UK. Unrecorded prior to 1999, it was discovered at a coastal location in Essex that summer (Dewick and Gerussi 2000) following northward range expansion in Europe, probably in response to climate warming. Within a decade it is now fairly widespread in suitable habitats (still waters with much pondweed, particularly *Ceratophyllum*) through much of southern and central England. Our first records were in 2001 from Essex sites such as Bedfords Park near Romford as well as observations further west at LWC, where there are now significant populations. It is now widespread through the LNHS area and during 2008 over a hundred adults were counted (including tenerals) in a large ornamental garden fish pond (with much pondweed) near Clapham Common. The prospects for this species look excellent as it becomes one of our more numerous species, something Cynthia could never have envisaged! As to the future, it is possible that other species may well also colonize; several species on the near Continent are expanding north-westwards. These are exciting times for the student of Odonata.

Conclusions

Cynthia Longfield's legacy is most obvious in the broad public appeal that dragonflies now enjoy in Britain. Her work on London's dragonflies has provided us with a baseline against which we can now measure the changes in fortunes of this charismatic group of insects during a time of raised environmental awareness, local changes in the London landscape and global climate change.

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Survey of Bookham Common

SIXTY-SEVENTH YEAR

Progress Report for 2008

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Introduction (Stuart Cole, Chairman, Bookham Common Survey)

I, along with Alan Prowse representing ornithological interest, had one formal meeting with the National Trust wardens, Ian Swinney and Rob Hewer to discuss the continuing management of Bookham Common. We were all in accord in recognizing the need to prevent the whole Common from becoming climax woodland in order to maintain the locality's biological diversity. In pursuance of this the NT is both thinning trees in the interior of the woodland to create glades and suppressing the establishment of trees and shrubs in the existing open areas outside. As well as mechanical removal of woody plants in the open areas there is a regime of cattle grazing in place outside the woodland. The value of this work is not always appreciated by the public; some dog walkers, for instance have complained about the removal of trees reducing the shade even though most of the Common is, and will remain, dense woodland.

On the invertebrate front the dismal summer following an equally poor year in 2007 led to a somewhat disappointing season. Nevertheless, we held two reasonably successful study days thanks to the enthusiasm of the respective leaders and appreciative members. In addition there were the year-round monthly entomological and botanical survey days, the latter guided by Steve Mellor.

The beetles, butterflies, Odonata and Orthoptera of Bookham Common are pretty thoroughly known and we are trying to extend cover to other insect groups. With the help of Paul Wheeler and Tristan Bantock we have begun to survey the moths and Hemiptera. This will include the occasional light-trapping nights.

The anticipated publication of the Bookham Beetle List is further delayed but we will endeavor to bring this out in 2010.

Birds (Alan D. Prowse)

A male pied flycatcher at Hundred Pound Bridge on 26 April seen by Dave Harris was the first record for the Common. A red kite flew north also on 26 April (Ian Swinney). On the Surrey Bird Club site it was recorded that a raven flew NE across the Common on 13 July at 11.55 a.m. No further information is known, but if this record is accepted it would be another new species for the Common, though it is not in the accepted (or not accepted) records published by the SBC to date of writing.

On 9 December hawfinches were recorded first by Steve Spooner, the numbers rising to seven on 15th (SBC site) and nine on 24th (ADP). On the last date they were spread over the Common on Central, Bayfield and Western Plains, a much wider area than in recent winters, though they were often reported on Western Plain in winter thirty years ago.

On 10 December a firecrest was found in the holly understorey by the ponds. The species has been found each year in this area in winter for several years.

The heronry had sixteen successful nests, a figure much in line with recent records. It is the only heronry in Surrey in an area of public access, and the birds have moved gradually to a fairly undisturbed part of western Central Wood. Coots nested on the Isle of Wight and Eastern Hollow Ponds, little grebes on those two ponds and Western Hollow Pond. With necessary thinning of the surrounding vegetation, the ponds have become more open to disturbance from the increasing numbers of dogs and their walkers. This may be the reason for the rarity of mandarin duck records, as the species is still regular in moderate numbers at adjacent waters.

Sparrowhawks nested again on the Common, probably two pairs. A pair of buzzards occupied an area centrally but there was no evidence of attempted breeding again this year. Several other pairs are in the vicinity. Kestrels were seen displaying on Chasemore Farm to the immediate north, with another pair on the Common.

Red-legged partridges are not seen often, so a record of two on Western Plain on 19 March is noteworthy. Pheasants are common residents. Grey partridges have not been recorded for many years; the species was given vagrant status by Melluish in 1960, though recorded as nesting 'at Bookham' in 1969.

Stock doves were recorded singing from springtime into late summer, and their numbers seem to have increased a little from the low levels of the 1990s. There were no records of turtle doves during the year. Ring-necked parakeets are recorded at the Common from time to time, and they are known to nest in the surrounding area, but no suspicion of nesting on the Common has yet emerged.

Two male cuckoos were recorded in the plains area.

Both the green and great spotted woodpeckers are common in the woodland, as well as being present on the plains. The lesser spotted woodpecker is elusive. Up to four territories have been known in recent years, but the species is declining nationally and locally, and there were no records this year, although cover was severely reduced because of illness.

Five pairs of nightingales nested during the year. Nesting on Central Plain has ceased since the clearances. A pair nested on Isle of Wight Plain in an area hopefully prepared for the species several years ago. Another pair occupied a new area on Western Plain. These two pairs, being isolated from each other, gave reduced song output, making surveys more difficult, but there were three pairs in the traditional Western Plain site.

Song thrushes seem to have made a partial recovery from their previous low numbers. Eleven territories were known in the area of Western and Isle of Wight Plains with the Isle of Wight, and indicative territory size calculations (Prowse 2008) suggested territory size of about one hectare.

Among the warblers, the willow warbler shows no sign of reversing its severe decline of the last ten years. Three territories were recorded (36 in 1997, 29 in 1998). Other warblers were not surveyed but numbers seemed unexceptional.

In the last report, it was mentioned that Paul Goodman had recorded a spotted flycatcher collecting food in July 2007. Frank Cannings has informed me that he too saw the species in that area carrying food in 2007, and again in 2008. There are only five other records of the species on the Common since 1990, and none since 2003.

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Mammal boxes (Alison Fure)

In past editions of *The London Naturalist* there have been descriptions of the many annual vegetation changes at Hundred Pound Wood since the felling of poplar trees in 2001. This year, whilst the usual barrier of brambles lined the boundary of the wood, this soon gave way to a layer of perennial dog's mercury *Mercurialis perennis* and meadowsweet *Filipendula ulmaria*. Even though the vegetation was less vigorous, it was not possible to reach some of the mammal boxes. Experience indicates that vegetation may be penetrated another year, especially if the deer numbers are allowed to increase.

The boxes are so well made that providing grey squirrels do not remove the lids, they remain in good condition. Box characteristics are dependent on their maker and those crafted by the late Ian Menzies are particularly robust. They have a perspex viewing lid, which prevents water ingress as well as keeping the occupant warm and safe (Figure 1). During a box check (spring 2008) about 80 per cent of the boxes contained tits, mostly blue tits *Parus caeruleus*, with two occupied by great tits *Parus major*. In cases where birds have persistently used boxes, nest tubes from juice cartons or tree tubes have been provided as nearby alternatives (Figure 2). Wrens *Troglodytes troglodytes* often use the tubes as night roosts. There were signs that woodmice *Apodemus sylvaticus* had overwintered in some, although all had left early this year.

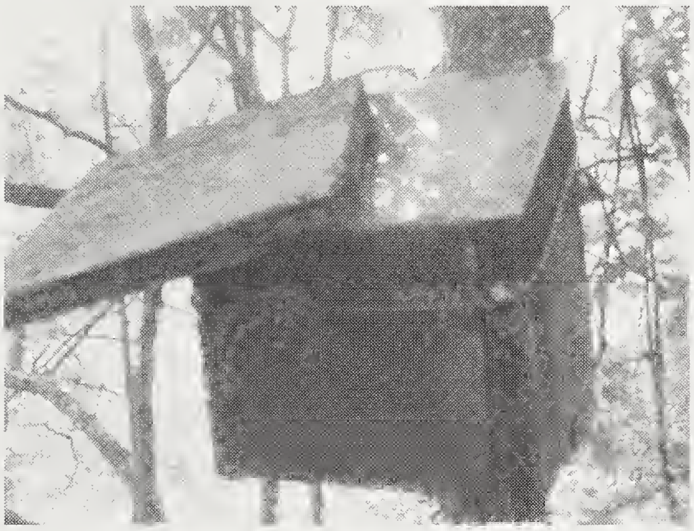

FIGURE 1. Box showing perspex lid.

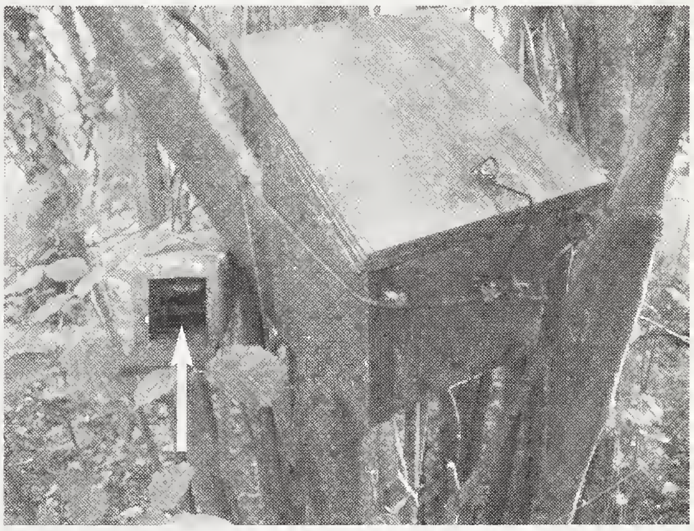

FIGURE 2. Arrow marks nest tube adjacent to box.

Box occupants in Stent's and Kelsey's Wood tend to be more diverse than at other locations. Even so, nothing could prepare for the opening of a box in Kelsey's Wood, although the noise should have warned that the pile of leaves left by woodmice had been superseded by buff-tailed bumblebees *Bombus terrestris*.

Abandoned nests are often used by dormice *Muscardinus avellanarius* and two nests showed characteristic signs of occupancy, a nest within a nest. Dormouse droppings in spring are often yellow due to the amount of pollen eaten but this year dark droppings were found in the middle of a converted tit nest which were despatched to a researcher for dietary analysis.

Invertebrate Field Study Days

Dragonflies and other insects Field Study Day, 12 July 2008

(Neil Anderson)

The weather was somewhat disappointing for this study day being mainly overcast with a few sunny spells and showers later.

Being initially cool, butterflies and other warmth-loving insects were far and few in number. Ringlets followed by meadow browns were the first species to be encountered. The more widespread species were present in low numbers — singletons of speckled wood, gatekeeper, large and green-veined whites and red admiral and two commas.

With some more warmth in the afternoon for a while some of the special species of the common were observed. About fifteen silver-washed fritillaries (with several nectaring on bramble), five white admirals and four purple hairstreaks were counted and photographed where possible. At the well-known master tree site a solitary male purple emperor was seen. A couple of nettle-tap moths added some lepidopteran interest.

If butterfly numbers seemed low, the cool conditions as we searched the Isle of Wight Pond made Odonata observations dire! All our Odonata sightings came from glades where a single broad-bodied chaser and about ten common blue damselflies amounted to the meagre total!

Amongst rank vegetation a number of nymphs of both dark and speckled bush-crickets were found for the party to inspect.

A few Coleoptera were discovered — the very successful invader, the harlequin ladybird, the regular two labiate-feeding chrysomelids, *Chrysolina herbacea* and *C. polita* near the ponds, and another leaf beetle, *Cassida rubiginosa* which feeds on various Asteraceae. The most numerous beetle was the ubiquitous soldier beetle, *Rhagonycha fulva*, usually on hogweed umbels. Also found on this plant were a couple of the familiar longhorn, *Rutpela maculata*.

Several syrphids were identified including the distinctive *Volucella pellucens* and a couple of *V. inanis*; the larvae of both species being scavengers in the nests of social wasps. Another distinctive hoverfly found was *Myathropa florea* which is dependent on trees with wet rot holes. Other species recorded were *Episyrphus balteatus*, *Melanostoma scalare* and *Helophilus pendulus.*

Generally a rather disappointing visit due to the weather and 2008 followed 2007 in having a very wet and generally cloudy summer, impacting on many insect populations.

Grasshopper and bush-cricket Field Study Day, 9 August 2008

(Gavin Hawgood)

Fourteen members assembled for the day at Bookham station on an unexpectedly sunny morning, an excellent turn-out given the dire weather forecast (continuous rain from mid morning onwards). I began by expressing my and the whole group's immense sadness at the absence of the Society's and Bookham's dear friend Ian Menzies, who had very sadly passed away earlier in the year. This particular annual event had always been hugely important to Ian and his immense enthusiasm and unparalleled entomological knowledge would in future, apart from anything else, surely result in less-informed study days at Bookham.

I then introduced the day and briefly described two of the target species under investigation — rufous grasshopper *Gomphocerippus rufus,* and short-winged cone-head *Conocephalus dorsalis,* with the aid of several hand-outs and some excellent digital photographs taken by group members at the previous year's study day. A third, somewhat surprisingly elusive orthopteran at Bookham, lesser marsh grasshopper *Chorthippus albomarginatus,* was ear-marked as the third target species for the day.

In spite of the threatening weather and the beginning of what proved to be steady rain for the rest of the day, proceedings got off to a good start with reassuring numbers of dark bush-cricket *Pholidoptera griseoaptera,* singing in the extensive bramble lining the path out to Bayfield Plain. A brief interlude saw the presence of a female wasp spider *Argiope bruennichi,* which, in line with members' relatively few sightings elsewhere during the year, appeared to be markedly smaller than specimens recorded in previous years.

In line with the trend over recent years at Bookham, there appears to be a steadily increasing colony of rufous grasshopper *Gomphocerippus rufus,* establishing itself in the Central Plain area. Although, as on the 2007 study day, only males were seen/studied in this area, there is no doubting a gradual increase in numbers. The favoured, recently reintroduced low scrub grass habitat will need careful management to ensure a continual increase in *rufus* numbers.

Although on this occasion Central Plain produced little else of note, Bayfield coming to the rescue with good numbers of the more common orthopterans such as meadow grasshopper *Chorthippus parallelus* and common field grasshopper *C. brunneus*. Further examples of dark bush-cricket were also heard along the margins, together with excellent views (in the rain!) of speckled bush-cricket *Leptophyes punctatissima* and long-winged cone-head (including nymphs) *Conocephalus discolor*.

As in 2007, in spite of fairly extensive beating and being undoubtedly present, no examples of oak bush-cricket *Meconema thalassina*, were found. Again, there was a noticeable absence of any real numbers of Roesel's bush-cricket *Metrioptera roeselii*, its loud stridulation normally dominating the orthopteran scene. The day's unseasonably low temperature (maximum 19° Celsius) and somewhat overcast rainy conditions may have been the chief reason for this paucity of numbers, which may also have explained the complete lack of any examples of common green grasshopper *Omocestus viridulus*, a small colony of which is known to exist on Central Plain.

Probably the most encouraging encounter of the day was at Isle of Wight Pond where an increasing, closely knit colony of short-winged cone-head *Conocephalus dorsalis*, was found at the water's edge. Hopefully, this taxon, first rediscovered in 2005 after eight years' absence from the Common, will now continue to grow in number year on year.

Unfortunately, the positive news on the *rufus* and *dorsalis* front was not repeated in the case of lesser marsh grasshopper *Chorthippus albomarginatus*,Yet again, no definite examples of the study day's third target species were found in the most likely area around Isle of Wight Pond, nor anywhere else on the Common. It would appear therefore to be the case that, with the notable exception of several sightings in 2005, there have been no known specimens of *albomarginatus* ever recorded at Bookham.

Regrettably, the ever worsening mid-afternoon weather at Bookham and lack of sufficient transport prevented the traditional sortie to Wisley and Fairmile Commons, where at least a further four species of Orthoptera can usually be guaranteed.

A total of eight species for the day proved a reasonable tally, especially in view of the disappointing weather conditions. More importantly, however, the 2008 study day reinforced a number of exciting new trends at Bookham, which, it is hoped, will trigger further concentrated study over the next few years. Our much-missed, erstwhile leader, Ian Menzies, would surely have been encouraged by the progress the Orthoptera continue to make on the Common, the Common he personally did so much to safeguard for continuing study purposes.

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Book reviews

Birdwatcher. The life of Roger Tory Peterson. Elizabeth J. Rosenthal. The Lyons Press, Guilford, Connecticut. 2008 (USA), 2009 (UK). 437 pp. Hardback, glossy dust jacket, £19.99. ISBN 978 1 59921 294 4.

For birdwatchers, life before 'Peterson' was extremely difficult compared to the present day. We had Coward's *The birds of the British Isles and their eggs*, either the three-volume edition, or the single condensed volume in the 'Wayside and Woodland' series, with their classical 'posed' paintings by Thorburn and others. And we had Fisher's three paperback Pelican volumes with black-and-white drawings by 'Fish-Hawk': these were the most popular for field use, especially as James Fisher was well-known to us all at LNHS and RSPB meetings, and they could be afforded from pocket money. We also had, of course, Witherby's five-volume *The handbook of British birds*, if you were rich enough or could save up to afford the £7 for the set in the late 1940s. This was the ultimate and is still not surpassed in many respects. I actually met a fellow birdwatcher on the North Kent Marshes one day who had a set of the *Handbook* in his rucksack!

But then, in the early 1950s, we learnt that Roger Tory Peterson, together with Guy Mountfort and our member Phil Hollom, was working on a field guide to the birds of Britain and Europe that was based on his revolutionary system of field identification of North American birds which first appeared in 1934. Shortly before the new book appeared in January 1954, Guy Mountfort had lectured to us on warbler identification using plates from the forthcoming volume, and this did much to whet our appetites. In the decades since, field guides in numerous other disciplines have used Peterson's identification pointers and layout — life has become much easier!

Birdwatcher is a fascinating read of the life of the man 'who taught the world the joy of watching birds', not only in America and the UK, but across the globe. And, of course, his life is not restricted to America where he was visited by our leading ornithologists — Peterson spent many happy times in the UK, indeed, the October 1952 photograph by Eric Hosking on the dust jacket shows Peterson sketching waders for the guide to Hilbre Island on the Cheshire Dee. He also visited the Coto Doñana on three occasions in the 1950s with Mountfort and others on their 'Wild Spain' expeditions.

This meticulously detailed biography brings together the post-war development of birdwatching in Britain and Europe. Elizabeth Rosenthal and the publishers are to be congratulated in presenting us with a book that is a pleasure to hold and to read and to delve into again.

K. H. Hyatt

Darwin. A life in poems. Ruth Padel. Chatto & Windus, London. 2009. 141 pp., A5 hardback, £12.99. ISBN 978 0 701 18385 1.

In January 2009, BBC Radio 4 broadcast a number of programmes to mark the bicentenary of Charles Darwin's birth and the 150th anniversary of the publication of *On the Origin of Species.* One series was 'Darwin. My Ancestor', a selection of poems written and read by his great-great-granddaughter and prize-winning poet Ruth Padel. In this book, which has an attractive coloured dust jacket with a central portrait of Darwin, we have a collection of her poems covering the life of Charles Darwin and his family, his travels, and his correspondence with Wallace, Hooker and Lyell.

The book has already had flattering reviews from poets and scientists, but I am the last person to tell our readers how to appreciate poetry — it was the most difficult subject of my schooldays! However, I have read it once and I shall be reading it again. Very conveniently, on the outer margins of the pages there are notes to which the poems relate, enabling one to adjust one's thoughts and possibly take the relevant book from the shelf to delve into further. Many of the poems contain quotations from Darwin himself, from his wife Emma, and from his correspondents mentioned above. These are drawn from his books, scientific papers, autobiography, journals, travels and letters.

To quote from the dust jacket, 'In this extraordinary sequence of poems, using multiple viewpoints — even, at one point, the orang-utang at London Zoo — Ruth Padel follows the development of Darwin's thought, the drama of the discovery of evolution, and fluctuating emotions in Darwin the husband, the naturalist and the tender father, in a powerful tribute to her famous forebear'.

K. H. Hyatt

Epiphyllic and epifungal liverworts on Hampstead Heath, London

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Jeff Duckett made these unusual sightings on Hampstead Heath during a field meeting of our Hampstead Heath Study Group, so it seems appropriate to reprint his article for the benefit of LNHS members. We are grateful to Jeff, and to Ian Atherton, editor of the British Bryological Society's membership magazine Field Bryology, *for permission to reprint the article which appeared in No. 95, June 2008, pages 8–10.*

* * *

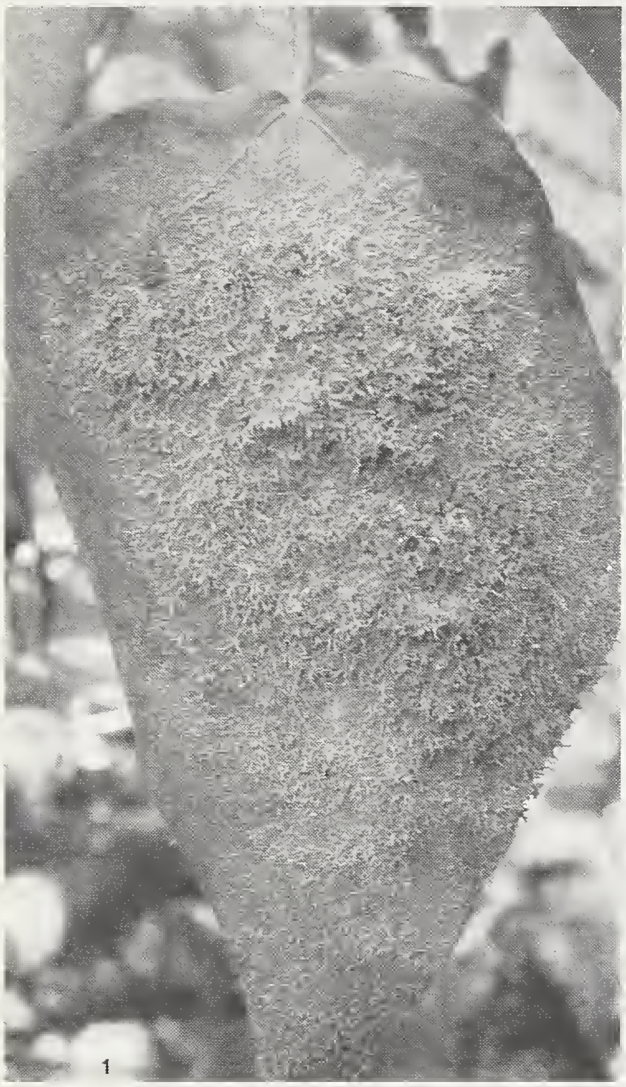
Bryophytes growing on leaves and on the fruiting bodies of fungi may be a very rare sight outside of tropical rainforests. But a recent excursion to Hampstead Heath, near central London, has uncovered both phenomena right here in Britain.

The recolonization of Middlesex by epiphytic bryophytes since the Clean Air Acts of 1956 and 1968 is detailed by Gardiner and Bowlt (1983), Wiltshire and Ellis (1995), Rieser (1998) and Kent (2000). The reappearance of taxa on the fringes of north-west Middlesex has been followed by their discovery on Hampstead Heath less than five miles from central London; for example *Frullania dilatata* in 1983 and 1989, respectively, *Radula complanata* in 1996 and 2006, and *Orthotrichum pulchellum* in 1992 and 2005. *Metzgeria fruticulosa* and *M. temperata* had single recent records, both from 1996, and it was not until 2005 and 2006 that they were discovered as solitary isolated colonies on Hampstead Heath alongside the first Middlesex record for *Microlejeunea ulicina*. Regular visits to Hampstead Heath in 2007 produced further localities for the two *Metzgeria* spp. and *Microlejeunea ulicina* on a range of trees, including elder, *Prunus*, turkey oak and willows, but always in small quantity.

A bryological excursion by the Hampstead Heath Flora Group of the London Natural History Society on 30 March 2008 revealed a dramatic increase in these three species with extensive patches, not only on all the aforementioned trees, but also on gorse. Most remarkable of all, however, was a discovery on ivy and elders growing by the stream in perhaps the most sheltered valley of the Heath below the so-called 'Bird Viaduct'. In this secluded dell, the adaxial surfaces of dozens of leaves of *Hedera helix* subsp. *hibernica* (G. Kirchn.) D.C. McClint. were almost completely covered with *Metzgeria fruticulosa* and *Microlejeunea ulicina* creeping over its highly gemmiferous thalli (Figure 1). The same two liverworts had also spread from dead elder branches onto the fruiting bodies of the bracket fungus *Trametes hirsuta* (Wulfen) Pilát (Figure 2). As far as I am aware, these are the first records for these liverworts growing on angiosperm leaves and on fungi.

Epiphylls are a characteristic feature of lowland and montane tropical rainforest trees, particularly near water (Pócs, 1982*a*), but outside the tropics are extremely rare (Porley, 1996; Porley and Hodgetts, 2005). Indeed, in Britain the only recorded instances are of *Metzgeria fruticulosa* growing on leaves of box (*Buxus*) in the Chilterns and on Exmoor. Elsewhere in Europe the same has been noted in the Pyrenees and the Caucasus (Pócs, 1982*b*). There are, however, numerous records of bryophytes growing on the long-lived leaves of filmy ferns, not to mention the frequent occurrence of members of the Lejeuneaceae on other bryophytes (Hill et al., 1991, 1994).

Colonization of *Buxus* leaves by *Metzgeria* is a combination of direct establishment via gemmae and thallus growth from stems onto the petioles and leaf laminae (Porley, 1996). The absence of *Metzgeria* from the petioles and stems of the Hampstead Heath *Hedera* indicates the former as the sole route, whereas *Microlejeunea ulicina*, where sexual reproduction is unknown and gemmae are absent (Paton, 1999), could only have arrived from caducous stem fragments. The epifungal *Metzgeria* almost certainly spread there from the adjacent elder branches.



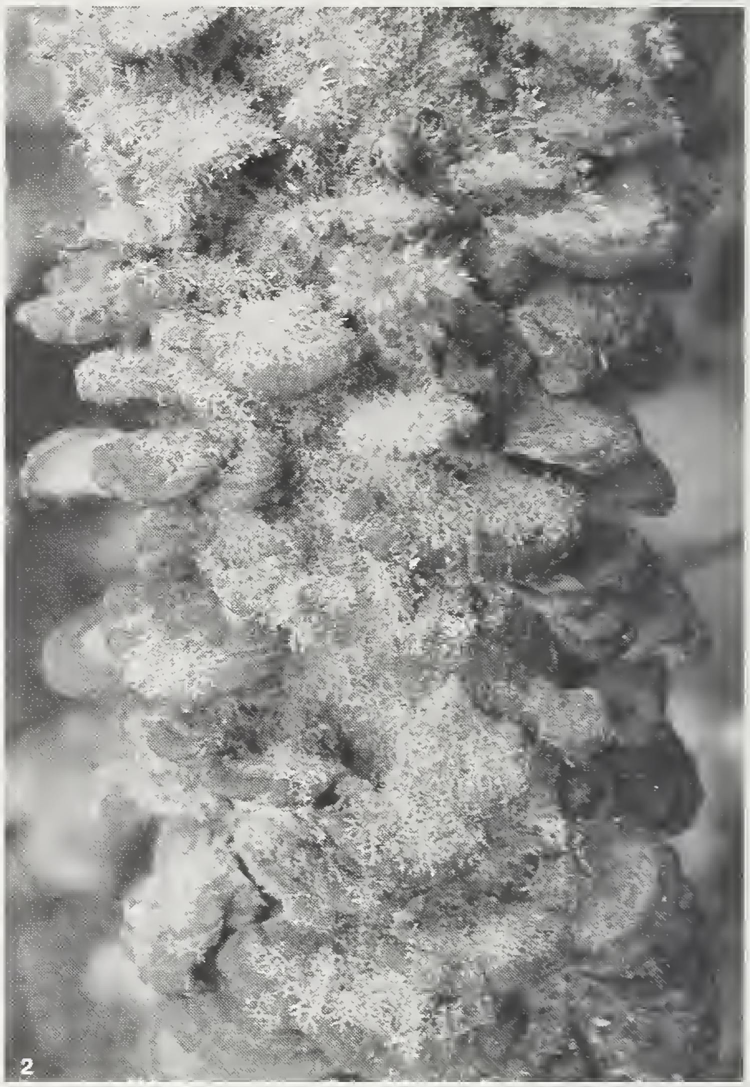


FIGURE 1. Leaf of *Hedera helix* subsp. *hibernica* almost covered with *Metzgeria fruticulosa*. *Photo: Jeff Duckett*

FIGURE 2. *Metzgeria fruticulosa* growing over fruiting bodies of the bracket fungus *Trametes hirsuta* on a dead branch of *Sambucus*. *Photo: Jeff Duckett*

Leaf longevity and durability are key factors predisposing tropical trees to epiphylly. The leaves of *Buxus* clearly meet these criteria, though Porley (1996) did not determine their actual longevity. Examination of the growth rings on the *Hedera* on Hampstead Heath revealed that its liverwort-invested leaves were only two or three years old. Thus, their colonization by *Metzgeria* and *Microlejeunea* must have been very recent and rapid, a conclusion closely in line with the very recent dramatic increase in the abundance of these two species on Hampstead Heath. The most likely explanation for both their spread and colonization of unusual habitats is the very wet summer of 2007 followed by the mild wet winter of 2007–8, both allowing almost continuous bryophyte growth. Against climate change predictions of wetter summers and mild winters in southern England, bryophyte monitoring programmes should perhaps embrace recording of usual habitats as well as traditional recording of distribution patterns.

Acknowledgements

The author thanks Howard Matcham for identifying *Trametes hirsuta* and Mark Hill for making available the database of Middlesex bryophytes.

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Book review

London's Changing Natural History. Classic papers from 150 years of the London Natural History Society. Edited by Mark Burgess. London Natural History Society. 2008. 264 pp., paperback, £7.50. ISBN 0 901009 25 3.

This book is a natural history treasure, published to celebrate the important contributions to the Society's journals over the last 150 years. The unassuming cover belies the fascinating wealth of information contained within, skilfully brought together by Mark Burgess.

A series of twenty-five papers has been chosen from volumes of *The London Naturalist* and other LNHS publications from 1916 to 1997 to capture the essence of study and recording natural history in its widest sense in the capital. Each paper is preceded by a commentary, written by present members of the Society, assessing the significance of the original paper, the changes since it was published and its relevance now. These thoughtful pieces give a fascinating insight into the development of the city and its surroundings.

The topics covered range from birds, mammals and fish, through spiders, butterflies and other invertebrates, to flora, bryophytes and fungi. One series of papers documents the recolonization by flora and invertebrates in the aftermath of World War II bombing in the Cripplegate area, now developed as the Barbican Centre. Other papers document the benefits of control of water and air pollution on fish and bird populations. The history of the society and the people involved, many of whom are national experts in their subjects, are also recognized.

The papers are arranged chronologically starting with the Presidential address from 1916 setting out the state of the theory of evolution fifty years after publication of Darwin's *On the Origin of Species* which demonstrates the gaps in the science which were still hampering understanding. A fascinating paper from 1943 by Richard Fitter describes the massive starling roosts in Trafalgar Square; their subsequent disappearance was undocumented. The commentary speculates on how this could have happened and brings us up to date on the possible reasons for the change.

More recent papers on, for example, wild flowers of London W1 (1978), butterflies of London's East End (1987) and fungi of Haringey (1992) demonstrate the benefits of systematic recording and monitoring to evaluate the environmental impacts of change and the fact that you do not need to travel to the countryside to discover wildlife. I particularly enjoyed the paper from 1962 and commentary on 'The Buried Rivers of London'. The theme of the paper is the degradation of the waterways at a time when ecology was not part of urban planning. The commentary notes how much attitudes have changed and assesses how far we have progressed since then.

As a resident of Hertfordshire, living just outside the twenty-mile radius LNHS area, I thoroughly recommend this book which brings to life the wealth of information available within the LNHS. As Secretary to the Hertfordshire Natural History Society (only established in 1875), I am tempted to investigate our own archives to produce a similarly inspiring book to throw light on our changing world.

LINDA SMITH

Kew lichenized ascomycetes — an annotated list

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Abstract

A list is presented of records of 180 lichen species from the Royal Botanic Gardens, Kew, the largest total for any site in the London area. Numbers have probably been rising rapidly ever since London air quality improved in the 1980s, but the detailed progress of this rise is unknown. As recently as January 1998 only forty-three species had been recorded, including five not seen since 1906 and presumed extinct at Kew. By the end of 1998 several recorders had combined to swell this total to 110 species, and seventy more have been recorded since. Only forty-nine species are backed by voucher collections (listed); a few of the others are noted as suspect. The list includes some artifically imported species that flourished for a while but are no longer present (nine on young trees in a temporary show garden, two on granite boulders now overgrown by *Lecanora muralis*). A note is also made of five lichenicolous fungi.

Introduction

Kew Gardens lie some six miles (10 km) from the centre of London on the south bank of the River Thames and comprise over 300 acres (120 ha) of garden, park and woodland. The diversity of the site means there are many niches to be colonized. It has also been regularly visited by lichenologists. These two facts probably explain why it has the most records for a site in the London area.

The gardens are considered to date from 1759, when William Aiton was appointed gardener; but it was when George III inherited Kew Gardens on the death of his mother Princess Augusta in 1772 that a serious botanical purpose was developed. The King was influenced by the polymath and entrepreneur Joseph Banks who was the major force behind making Kew a centre of international botanical excellence and influence. Many famous names have been associated with the planting such as William Kent, 'Capability' Brown, William Chambers, and William Nesfield (Desmond 2007). The year 2009 marks the 250th anniversary of Kew and the 130th anniversary of the Mycology Herbarium, one of the largest in the world, an important resource for vouchers and taxonomic back-up.

Air quality is important for lichens and the closure of Brentford power station, on the opposite bank of the river, in 1963 after 142 years of working life meant that the air started to get cleaner. The Clean Air Act of 1956 had led to an amelioration of air quality generally in London which was particularly noted in the 1980s, and soon had a very marked effect on lichen diversity at Kew.

This list is a revision of a previously unpublished list by the second author, who makes no claim to lichenological expertise. He accumulated a list of who had claimed what names and when over a century of lichen recording at Kew, this being part of a larger project covering all fungal recording at Kew. The critical appraisal of the list, checking for the existence of voucher specimens, and further research is the work of the first author who is the lichen recorder for the London Natural History Society and does not claim to be a lichen expert but has some experience of lichens in London. The result should be considered a working compilation rather than a definitive list.

Scope

Wildlife recording at Kew has traditionally included Kew Green, and thus the churchyard of St Anne's Church; but for lichens this is best thought of as a separate site and is here excluded. In fact only two species recorded from St Anne's are as yet unrecorded in the Gardens: *Caloplaca dichroa* and *C. teicholyta.* Records from the Thames towpath bordering the Gardens are also traditionally included. The few such records are noted here, but all are of species also known from within the Gardens.

A decision was made to include lichens that have only reached Kew by human intervention, since in all cases the imported species have survived for several years following importation. This contrasts with a number of imported species to the Natural History Museum Wildlife Garden, which died within a few weeks. Two groups of imported species together contribute twenty species to the overall total.

1. Two Cambrian glacial granite boulders were placed, by crane, in the 'Secluded Garden' on 1 February 1995 and others in the stream on 4 April of the same year. These have provided the only records of ten species, in fact the only species in the list recorded as 'on granite'. Two of these, *Acarospora veronensis* and *Stereocaulon dactylophyllum,* have recently succumbed to overgrowth by *Lecanora muralis.* No *Stereocaulon* has been seen lately. Overgrowth by nitrophiles is one of the problems of preserving imported species. Some of the species on these boulders are likely to be also present elsewhere in the Gardens.

2. In 2003 Mary Reynolds (a Gold Medal winner at Chelsea Flower Show the year before) designed a garden situated on the lawn near Brentford Gate. The Department for Environment, Food and Rural Affairs (Defra) helped fund it to promote biodiversity. It involved the importation of a number of young trees from Northern Ireland which came complete with twelve species not previously recorded from Kew. They all appeared to be still flourishing in 2005, but in 2008 the garden was removed and the lawn restored, so removing all twelve species. Nine of these: *Catillaria nigroclavata, Graphis scripta, Opegrapha atra, O. herbarum, Pertusaria hymenea, P. leioplaca, Phaeographis dendritica, Pyrenula chlorospila,* and *Rinodina exigua* are at present unknown in the Gardens. The other three: *Arthonia radiata, Lecania naegelii* and *Porina aenea,* have since been refound elsewhere. The loss of the *Pertusaria* species is particularly sad as they take a long time to recolonize. It is more likely that *Graphis elegans* would appear naturally than *G. scripta,* as it is more acid-loving and more often found in urban areas.

Recording at Kew

Recording has changed over time from 'present or absent' to a more detailed approach but not yet to a level that allows much analysis. The more associated information recorded the more useful the record. A voucher is invaluable, though it is not always possible to obtain because of damage to the substrate. Note that the public are not allowed to collect in the gardens.

There must be doubts about the validity of a few of these records. Most are field records but where a voucher has been kept information has been included. Only forty-nine species have voucher specimens; the **K(M)** number refers to the entry in Herbtrack, the computer system through which a particular specimen can be traced in the Kew Mycology Herbarium. **BM** refers to the Natural History Museum. A few specimens are in the private herbaria of A. Aptroot and C. Hitch.

A list by Bernard Verdcourt confined to published Kew lichen species up to the year 1999 (seventy-seven species) was given in Verdcourt (2000). The present list adds over a hundred further species. Fifty further unpublished records were added in 1998 or 2004 by Peter James and colleagues (see below J&W98, J&K98, J&W04). Another forty species were published following the British Lichen Society visit of 9 January 2005 (L05). The earliest record (*Diploschistes muscorum*) dates to 1798, collected by Robert Brown, librarian to Joseph Banks.

Abbreviations used in the list and providing a chronological summary of lichen recording at Kew:

D1906: The original list of 15 'Lichenes' by Otto Vernon Darbishire (1906) in which only *Lepra viridis* (probably in fact the alga *Desmococcus olivaceus*) and *Lecanora dispersa* were reported to be at all common. The rest were described as 'mostly dwarfed and scanty'.

PJE67: Records by Peter Edwards in 1967 from the asbestos cement roof of a spirit store, published in JG72.

BJC70: Records by Brian Coppins, 17 April 1970, published in JG72.

JRL70: Laundon (1970).

JG72: Gilbert (1972). This incorporates the species found by him and det. by Laundon that were listed in Airy Shaw (1961).

JL74: J. Lonsdale 'Lichens, with particular reference to the lichens of Kew and to pollution' (unpublished project report using data from JRL70). This lists 41 species from the Borough of Richmond, of which 30 (including 5 then thought to be extinct) are from Kew Gardens plus St Anne's churchyard, Kew Green. Mean winter SO_2 levels 1967–9 of 150 $\mu g/m^3$ (zone 2) were cited to account for the contrast with 184 species in the Botanic Gardens at Göteborg.

MS85: Mark Seaward – unpublished list of 22 species he recorded in July 1985, of which 4 were new to Kew Gardens. No host details seen but *Trapeliopsis granulosa* on lignum (pers. comm.).

H&M89: Hawksworth & McManus (1989) listing 8 further species.

AA98: Records of 50 species made in the field by André Aptroot in a day visit 9 January 1998, 28 of which were not among the 43 previously recorded. Apart from one record on *Acer platanoides,* all were on either rocks in the Rock Garden or on one ash tree west of the Palm House (134-53-13403 in Compartment 247). No material retained in Britain, but a list was published (Aptroot 1998). Of the 28 species that were then new, 7 (all saxicolous) have so far not been recorded again.

J&W98: Unpublished records of 74 taxa recorded by Peter James and Pat Wolseley from Kew Gardens and St Anne's churchyard 24, 28 and 29 July 1998, 40 of which had been unrecorded from Kew before 1998. These 40 include 13 which had been independently recorded earlier in the year by Aptroot.

J&K98: 12 further species recorded by Peter James and Randolph Kricke on a follow-up visit in October 1998.

RK00: 5 further taxa recorded by Randolph Kricke in June 2000 but no substrates noted.

J&W04: Further records by James and Wolseley, 11 March 2004, including 10 more species.

L05: Around 110 species recorded on the BLS visit of 9 January 2005, at least 38 of them new, published in Wolseley and James (2005). Over half the additions were recent imports rather than natural colonizers. Two granite boulders in the 'Secluded Garden' yielded 10 new species; and a colony of young saplings imported from Northern Ireland in the 'Defra Garden' yielded 12 more (as discussed above). Andre Aptroot revisited 'his' ash tree of 1998 and recorded 12 species gained but 8 lost — see Aptroot (2005).

CH06: Visit by Dr Christopher Hitch with first author.

BAH07: Begoña Aguirre-Hudson (2007) plus visits with T. Kokobun in search of lichens for chemical extraction.

H&W09: 6 further species recorded by Henrici and Waterfield, June and July 2009.

Records

Nomenclature follows Smith et al. (2009) *The lichens of Great Britain and Ireland*. For synonyms consult the BLS website: www.thebls.org.uk

Acarospora
  fuscata (L05 on granite). The most common *Acarospora*.
  rufescens (J&W on a brick wall, L05). Not in Dobson (2005) but there are several other London records.
  smaragdula (L05 on granite).
  veronensis (L05 on granite). Now overgrown by *Lecanora muralis*.

Amandinea
  punctata (MS85, H&M89, AA98 on *Fraxinus* all as *Buellia p.*, J&W98, L05; **K(M)**137053 on sandstone in former rockery 3 May 2005, BAH & AW, det. CH; **K(M)**154037 on smooth bark of coppice *Salix lasiolepis*, E of bridge, 20 August 2007, coll. BAH & TK, det. BAH; **K(M)**154238 on bark of *Salix fragilis* var. *vasseliana*, NW side of lake, 20 August 2007, coll. BAH & TK, det. BAH). A common species especially in nutrient-rich areas and also found on benches.

Anisomeridium
  biforme (J&W04 on *Salix* in Conservation Area).
  polypori (AA98 on rock, unusual substrate, material preserved).

Aspicilia
  calcarea (H&W09 on buttress of Palm House).

Arthonia
  lapidicola (AA98 on rock in Rock Garden).
  punctiformis (J&W04 on *Corylus*).
  radiata (L05 on *Sorbus*, Defra Garden, AA62805, **K(M)**128248; H. Thüs 2009).

Arthopyrenia
  analepta (BAH07: as *A. lapponina* **K(M)**154240 on *Populus lasiocarpa*).
  punctiformis (J&W04 on *Corylus*).

Bacidia
  adastra (L05 on a palm in Palm House and on *Fraxinus*). Only London records, recently described.
  arceutina (L05 on *Fraxinus* **K(M)**128242; + CH herb.).
  arnoldiana (AA98 on *Fraxinus*; J&K98; L05 on *Fraxinus* **K(M)**128240 + rock).
  caligans (L05 on rocks ex Rock Garden).
  delicata (AA98 on rock + *Fraxinus*, J&W98 on *Fraxinus*, J&W04 on *Acer*, L05 on *Fraxinus*).
  egenula (L05 on rocks ex Rock Garden).
  laurocerasi (CH05 herb.).
  neosquamulosa (L05 on *Fraxinus* behind Banks Building and on *Magnolia*).

Buellia (and see *Amandinea*)
  aethalea (J&W98 on a brick wall, L05).
  griseovirens (AA98 on *Fraxinus*, J&W04 on bench, L05 on both).

Calicium

viride (L05 on *Fraxinus*).

Caloplaca

acris (L05, rocks ex Rock Garden as 'Species A').

cerinella (H&W09 on bench by Banks Building pond). Only London record.

chlorina (L05 Rock Garden).

citrina (JG72 – **K(M)**162226 on concrete paving, tennis courts, RBG Kew, 23 November 1958 J.L. Gilbert; MS85, AA98 on rock, J&W98 on brick, concrete etc.; **K(M)**137048 on rock, 3 May 2005, coll. BAH & AW, det. CH).

crenulatella (J&K98). A species more recorded as its habitat on concrete has become known.

dalmatica (J&W98 on brick and concrete – 'rather local in England', L05).

decipiens (J&W98 from brick wall of Temperate House tunnel and by The Pond – 'rather local').

flavescens (D1906 record *of Placodium murorum* is probably this fide JRL70, listed in JL74 as *C. heppiana* on the strength of this record; also H&W09 on buttresses of Palm House).

flavocitrina (L05 rock ex Rock Garden + *Fraxinus*; **K(M)**137046 on *Verrucaria nigrescens*, in rock garden, coll BAH & AW, det. CH.).

flavovirescens (J&W98 on brick, concrete and rock).

holocarpa (AA98 on rock, J&W on brick, concrete and by The Pond).

obscurella (L05 on *Fraxinus*, slanting bark, AA62803, **K(M)**128239).

saxicola (J&W98 on concrete pond margin by Jodrell Laboratory and by The Pond).

Candelaria

concolor (J&K98, L05 on *Fraxinus* + *Q. petraea*).

Candelariella

aurella (BJC70, MS85, AA98, J&W98 on Queen's Beasts and also on brick, concrete and rock).

medians (J&W98 by The Pond).

reflexa (AA98, J&W98 both on *Fraxinus*, J&W04 on *Zelkova*, L05).

vitellina (BJC70, MS85, AA98 on rock, J&W98 on *Fraxinus*, benches etc., L05). Very common on benches.

Catillaria

chalybeia (AA98 on rock, L05 on *Fraxinus*, slanting bark **K(M)**128238, AA62801).

lenticularis (PJE67, J&W98 on sandstone in Rock Garden).

nigroclavata (L05 Defra Garden).

Cladonia

chlorophaea (D1906, JG72 frequent in Rock Garden, J&W04 on *Nothofagus antarctica*).

coniocraea (JG72 few in Rock Garden, AA98 on *Fraxinus*, J&W98, L05).

diversa (D1906 as *C. cornucopioidea*). This is part of *C. coccifera* agg.

fimbriata (D1906, many recs to 1968 fide JRL70, **K(M)**76180 pathway, 23 November 1958, JLG; **K(M)**76183 back of old reservoir, Arboretum yard, 12 February 1961 JLG; MS85, J&W98 by The Pond; H&W09 on mossy walls, brick and stone).

furcata (D1906 on wood palings near riverside, JG72: **K(M)**76178 pathway near tennis courts, 23 November 1958 JLG).

pyxidata (D1906; **K(M)**76173 pathway near tennis courts 23 November 1958, JLG).

subulata (J&W04 on thatched roof of shed by Queen's Cottage).

Cliostomum

griffithii (J&W04, sterile on *Salix rubens* in Conservation Area).

Collema

crispum (AA98 on rock, J&W98 on concrete pool margin, L05 on rocks; **K(M)**137054 on sandstone, 3 May 2005 coll. BAH & AW, det. CH). The flattened isidia are quite distinctive.

limosum (D1906, 'now extinct' JL74). This species can only really be told from *C. tenax* var. *ceranoides* by the large muriform spores and 4-spored rather than 8-spored asci; and larger apothecia.

tenax (AA98 on rock). The variety of *C. tenax* is not noted.

Cresporhaphis

wienkampii(BAH07: **K(M)**154226 bark crevices of *Populus lasiocarpa* (1979–1111) by lakeside 20 August BAH & TK, det. BAH,with *Rebentischia unicaudata*; **K(M)**154239 bark of *Salix fragilis* var. *vaselliana* (1969–16339).

Cyphelium

notarisii (J&W98 – on a bench near Waterlily House, a notable rarity, but since found on other Surrey park benches, see Dobson (2003); Dobson + J&W04 on several benches on both sides of Palm House and one near Museum No. 1, but no longer on the 1998 one; **K(M)**122488 on bench near Palm House, 13 May 2004, BMS & BAH; **K(M)**124713 on bench near Palm House, 12 August 2004 BMS & BAH; L05). This species spreads by abrasion on one surface and deposition on another so should be looked for where people touch the bench. Many of these benches have recently been cleaned, but it survives in places.

Cyrtidula

quercus (J&W04 on *Corylus*; **K(M)**157650 on fallen twigs of *Populus* 23 May 08 BAH).

Dimerella

pineti (A.Henrici, February 2000, det. B.M. Spooner, on fallen *Larix* branch in Conservation Area). This species is often found at the base of *Fraxinus* in London.

Diploicia

canescens (J&W04 on *Sorbus aria*). This species appears to be spreading in London and is abundantly fertile on a wall in the park of Syon House across the river.

Diploschistes

muscorum (collected as *Lichen scruposus* Schreb. non Dicks. Fasc. Grass walks of Kew Gardens, August 1798, R. B[rown] redet. H. Thüs, material in **BM**000731245). Possibly the earliest record for any organism at Kew according to Verdcourt (2000), but not recorded since. It has been recorded in a nearby crematorium.

Evernia

prunastri (AA98, J&W98 both on *Fraxinus*, L05 on *Q. petraea*; AW 2009 **K(M)**162572 on *Malus* near Queen's Cottage). A fruticose species increasing in London with the amelioration of air quality.

Flavoparmelia

caperata (H&M89, AA98 + J&W98 both on *Fraxinus*, J&W04 widespread near Queen's Cottage and also on *Quercus rubra*, L05 on several hosts).

soredians (J&K98, J&W04 widespread, L05 on *Fraxinus*). A Mediterranean species now spreading rapidly in Britain.

Graphis

scripta (L05 on *Sorbus*, Defra Garden, AA62807, **K(M)**128247).

Haematomma

ochrolecum var. *porphyrium* (L05 on *Magnolia kobus*, **K(M)**127973, D.L. Hawksworth).

Hymenelia

prevostii (AA98 with a query, L05 on rock). Sunny calcareous sandstone. Only London records.

Hyperphyscia

adglutinata (RK00). Part of the nutrient-enriched species complex but not so common as *Physcia*.

Hypogymnia

physodes (H&M89, J&W98 on *Fraxinus*, L05 on *Catalpa* + *Q. petraea;* **K(M)**133607 on *Catalpa bignonioides* (1969-12222) near Palm House, 3 May 2006, coll. TK conf. BAH). An acidophile.

tubulosa (**K(M)**123496 under *Fraxinus* in Herbarium car park, 16 July 2004, BAH; L05 on *Catalpa* + *Q. petraea*).

Hypotrachyna

revoluta (J&W98 on *Fraxinus* as *Parmelia r.*, J&W04 on *Prunus* + *Quercus*, L05 on *Fraxinus*). Increasing in the London area as the air ameliorates.

Lecania

cyrtella (L05 on *Fraxinus*, slanting bark **K(M)**128237, AA62804).

erysibe (AA98, J&W98 abundant in Rock Garden, also elsewhere; L05 (**K(M)**137056 on sandstone, 9 January 2005, P. Scholz; **K(M)**137055 on sandstone, 3 May

2005, coll. BAH & AW, det. CH). A common species often found infertile when it can be recognized by the blastidiate thallus.

naegelii (L05 in Defra Garden, on *Fraxinus* **K(M)**128241 9 January 2005, AA62808; H&W09 on *Pistacia chinensis*).

rabenhorstii (AA98 on rock, J&W98 by The Pond, L05). Only London records.

Lecanora

aitema (J&W98 on bench). A species of acid bark especially *Pinus, Quercus* and lignum. Only London record.

albella (J&W04 on *Salix rubens* planted 1973 in Conservation Area). Usually found on *Quercus*.

albescens (AA98 on rock, J&W98 on brick and concrete; **K(M)**139619 Rock Garden, 22 June 2006, det. BAH). Common.

campestris (BJC70, MS85, AA98 on rock, J&W98 on benches, tarmac etc., L05). Common.

chlarotera (RK00, J&W04 on *Corylus* in Conservation Area, L05 on *Corylus* in Defra Garden and on benches; **K(M)**1228243 on *Fraxinus* bark, AA62811). Common on smooth bark.

compallens (J&W04 on *Zelkova* and on benches, L05 on several hosts). A split from *L. expallens* desc. 1999. On more-exposed side of tree, C-, probably more common than records show.

conferta (J&W98 on mortar). The status of this species is still being investigated.

confusa (J&K98, L05 on bench). According to Dobson (2005), some consider this a form of *L. expallens*.

conizaeoides (probably D1906 as *L. varia* on oak palings near Stable Yard, JLG58 on Herbarium wall, **K(M)**162232 on *Quercus* bark, Kew RBG, 1957, J.L. Gilbert 1; JG72, MS85, H&M89, AA98 on rock, J&W98 etc., **K(M)**128228, bench in Order Beds, 16 July 2004, coll. T. Kokobun, det. BAH, L05 on *Fraxinus* + benches, but no longer common).

dispersa agg. [see also *hagenii* and *semipallida*] (D1906 as *L. crenulata* – widespread; **K(M)**76165 on concrete, 16 December 1956, JLG, det. JRL; MS85, AA98 on rock, J&W98 on e.g. Queen's Beasts, brick, concrete, L05 on *Fraxinus;* **K(M)**137051 on sandstone, former rockery, 3 May 2005, BAH & AW, det. CH).

expallens (AA98, J&W98, L05 all on *Fraxinus*). Common.

hagenii (D1906 (sensu lato) = *L. dispersa*, AA98 (sensu stricto) on rock, an unusual substrate).

intricata (L05 on granite).

muralis (PJE67, JG72, MS85, AA98, J&W98 on brick, concrete, rock, etc.; **K(M)**121196 on stone, Japanese Gate, 20 January 2004, E.W. Brown, det. BAH; L05). A very common urban species.

polytropa (AA98 on rock, J&W98 on brick wall, L05 on rock).

pulicaris (L05 on *Corylus* in Defra Garden and on benches).

saligna (J&W98 on *Fraxinus*, L05 on bench).

semipallida (J&W98 as *L. xanthostoma* (described 1997) on basic rock by pool near Jodrell; as *L. flotoviana* L05 on rock; **K(M)**137052 (cf) on sandstone, former rockery, 3 May 2005, BAH &AW). A segregate from *L. dispersa*.

symmicta (J&W98 on benches, J&W04 on *Quercus*, L05 on both + *Fraxinus*).

Lecidea

fuscoatra (MS85, L05 on rocks). Common on nutrient enriched rock and brick. This species aggregate has recently been broken up and the most likely species segregate is *L. grisella* fide Aptroot (pers comm.).

Lecidella

carpathica (L05 on granite).

elaeochroma (J&K98, J&W04 on *Corylus* in Conservation Area, L05 on *Fraxinus*). One of the common species on young, smooth bark.

scabra (AA98 on rock, J&W98 by The Pond, L05 on rocks and benches). Common on acid saxicolous substrates.

stigmatea (PJE67, MS85, AA98, J&W98 on rocks etc., L05 widespread; **K(M)**137047 on sandstone in former Rock Garden, 3 May 2005, BAH &AW, det. CH). One of the commonest saxicolous species in London.

Lepraria

incana agg. (JG72, MS85, H&M89, AA98 on *Fraxinus*, J&W98 widespread, L05 on *Fraxinus*; **K(M)**162695 bark at base of *Quercus robur,* 1981/16034 W side of Palm House, 8 April 2009, BAH).

lobificans (**K(M)**162223 on concrete paving, tennis courts, RBG Kew, 23 November 1958, J.L. Gilbert; AA98 on rock; **K(M)**128235 rock(acid), 16 July 2004, T. Kokobun, det. BAH; L05 on rock).

membranacea (D1906 as *Leproloma lanuginosum*, JG72 in Rock Garden, J&W98 as *Leproloma membrancea* or ?*L. vouauxii* on sandstone in Rock Garden. Material collected in 2005 turned out to be *Lepraria lobificans* so these records remain unconfirmed.).

Leptogium

turgidum (L05 at edge of pool in Secluded Garden).

Melanelixia (formerly *Melanelia*, *Parmelia* p.p.)

fuliginosa ssp. *fuliginosa* (RK00).

fuliginosa ssp. *glabratula* (RK00, L05 on *Fraxinus*).

subaurifera (H&M89, AA98 + J&W98 both on *Fraxinus*, all as *Parmelia s.*, J&W04 on *Corylus* in Conservation Area, L05 on *Fraxinus;* **K(M)**162696 bark of low branches and trunk of *Juglans cathayensis*, near Princess of Wales glasshouse, 8 April 2009). This is the commonest brown '*Parmelia*' in London.

Micarea

denigrata (J&W98 on benches).

prasina (J&K98; A. Henrici **K(M)**121314 det. BAH on fallen twig of *Ulmus bergmanniana*, 23 January 2004).

Opegrapha

atra (L05 on *Corylus* in Defra Garden). A species now coming back into London.

gyrocarpa (L05 on rock).

herbarum (L05 on *Corylus* in Defra Garden, **K(M)**128245 on *Fraxinus* bark, Defra garden, AA62813).

rupestris (AA98 on rock) Only London record.

[A doubtful listing of *O. viridis* in Verdcourt (2000) is here considered a misinterpretation of the D1906 records of *Lepra viridis*, now thought to refer to *Desmococcus olivaceus*. See Laundon (1985).]

Parmelia (see also *Flavoparmelia, Hypotrachyna, Melanelixia, Parmotrema, Punctelia, Xanthoparmelia*)

saxatilis (D1906, 'now extinct' JL74, RK00, L05 on *Fraxinus*). Becoming rarer in London.

sulcata (H&M89, AA98 + J&W98 both on *Fraxinus*, J&W04 much near Queen's Cottage; **K(M)**121195 bark of fallen branch, near golf course, 20 June 2004, EWB det. BAH; L05 on *Fraxinus*). Now quite common in London.

Parmotrema

perlatum (AA98 on *Fraxinus*, RK00, both as *Parmelia perlata*, J&W04 widespread inc. *Quercus rubra* as *P. chinense*, L05 on *Fraxinus*; **K(M)**162635 on bark of *Cladrastis sinensis*, 6 April 2009, AW).

Peltigera

canina (D1906, 'now extinct' JL74). Probably *P. didactyla* or *P. membranacea*, possibly *P. hymenina* or *P. neckeri*. No *Peltigera* has been recorded recently.

Pertusaria

hymenea (L05 on *Fraxinus*, Defra Garden).

leioplaca (L05 on *Corylus*, Defra Garden).

Phaeographis

dendritica (L05 on *Corylus, Fraxinus, Sorbus*, Defra Garden; **K(M)**128031 on young *Corylus* trunk, Defra garden).

Phaeophyscia

orbicularis (PJE67 as *Physcia o.*, MS85, H&M89, AA98 + J&W98 both on *Fraxinus*, J&W98 also on e.g. Queen's Beasts, J&W04 widespread, L05 on *Fraxinus*). Very common.

Phlyctis

argena (J&K98).

Phylloblastia

inexpectata (immature) on *Camellia* leaves (CH &AW06, det. B. Coppins). Foliicolous lichens are rare in London.

Physcia

adscendens (H&M89, J&W98 on *Aesculus* and by The Pond, J&W04 on *Zelkova* etc., L05 on *Fraxinus* + bench; **K(M)** 147847 bark of *Catalpa bungei* near POW conservatory, 11 June 2007 BAH). Very common.

aipolia (L05 on *Q. petraea,* H&W09 on *Rhus* and on a bench). This species is increasing in London.

caesia (PJE67, JG72, MS85, H&M89, AA98 on *Fraxinus,* J&W98 on tarmac etc., L05 on *Fraxinus* + benches). Quite common.

dubia (J&W98 on *Fraxinus*).

tenella (H&M89, AA98, J&W98, L05, last three all on *Fraxinus;* **K(M)** 114713 fallen bark of *Platanus orientalis* var. *dissecta,* Herbarium car park, 16 June 2003, BAH). Very common.

Physconia

grisea (RK00, J&W04 on *Acer,* L05 on *Fraxinus*).

perisidiosa (AA98 on *Acer platanoides* near Temperate House.

Placynthiella

icmalea (J&W98 on *Fraxinus,* J&W04 on a bench).

uliginosa (J&W98 on benches).

Porina

aenea (L05 on *Corylus*? in Defra Garden, H. Thüs 2009).

Porpidia

crustulata (L05 on granite).

macrocarpa? (AA98 on rock, unconfirmed field identification).

soredizodes (AA98 on rock, L05 on granite).

tuberculosa (J&W98 on sandstone in Rock Garden).

Protoblastenia

rupestris (H&W09 on stone vase at north entrance of Palm House and elsewhere).

Protopannaria

pezizoides (D1906 as *Pannaria pezizoides,* mistakenly reinterpreted as *Lecanora muralis* fide Laundon, pers. comm.). No other London records.

Psilolechia

lucida (H&W09 on bricks of Queen's Cottage).

Punctelia

borreri (J&W04 on shrubs near Queen's Cottage, L05 on *Fraxinus*).

jeckeri (as *ulophylla* J&K98, J&W04 widespread, L05 on *Fraxinus*). Recent segregate from *P. subrudecta.*

subrudecta (H&M89, AA98 + J&W98 both on *Fraxinus,* all as *Parmelia s.,* L05 on *Fraxinus*).

Pyrenula

chlorospila (L05 on *Fraxinus,* Defra Garden, **K(M)** 128246, AA62806).

Ramalina

farinacea (J&W98, L05, both on *Fraxinus;* **K(M)** 162571 on *Malus* near Queen's Cottage).

Rhizocarpon

petraeum (L05 on rocks).

reductum (L05 on granite).

Rinodina

exigua (L05– earlier det. as *R. roboris*) **K(M)** 128244 on *Fraxinus* bark, Defra garden, AA62810, det. BAH). Status of this species in UK is being investigated; it could be included under *R. oleae.*

oleae (as *gennarii* BJC70, MS85, H&M89 (as *R. exigua* s.auct. Brit. on Thames bank at Kew), AA98 on rock, AA98 on *Fraxinus,* J&W98 on brick, on rock and by The Pond; inc. *R. subexigua* listed by J&K98, L05).

pityrea (= *R. colobina* s.auct. Brit.) (AA98, L05, both on *Fraxinus*). Only London records.

sophodes (J&W98 on *Aesculus* near Pavilion Restaurant).

teichophila (J&W98 by The Pond, listed in error as *R. teicholyta*).

Sarcogyne

regularis (JRL67 Temperate House wall, JG72, MS85, L05 on rock).

Sarcopyrenia

gibba (H&W09 on buttresses of Palm House).

Scoliciosporum
  chlorococcum (MS85, H&M89 on Thames bank by Kew Gardens).
  umbrinum (J&W98 on bench and on brickwork, AH: **K(M)**117639 on *Alnus glutinosa* twig, dead attached, by lake, 31 January 2004).

Staurothele
  sp. (L05 on rocks ex Rock Garden, collected by BAH, awaiting determination).

Stereocaulon
  dactylophyllum (L05 on granite). Now overgrown by *Lecanora muralis*.
  pileatum (BJC70). Not found recently.

Tephromela
  atra (H&W09 on stone vase by north entrance to Palm House).

Trapelia
  coarctata (JG72: K(M)76170 as *Lecidea coarctata* on brickwork of wall, 4 December 1960, JLG; MS85 on lignum, AA98, J&W98, **K(M)**128454 on rock, 16 July 2004, coll. T Kokobun, det. BAH, L05 in Rock Garden; **K(M)**137049 on sandstone, former rockery, 3 May 2005, BAH & AW, det. CH).
  placodioides (L05 on granite).

Trapeliopsis
  flexuosa (L05 on bench). Common on benches in London.
  granulosa (MS85 on lignum).

Usnea
  cornuta (syn: *U. inflata*) (J&W98 on basal boss of *Populus*, J&W04 small tufts on *Quercus*, ? also on *Prunus*)
  hirta (J&K98 – this record noted in Dobson (2005), L05 on *Fraxinus*).
  subfloridana (J&K98).

Verrucaria
  baldensis (J&W98 on limestone buttresses of Palm House).
  dolosa (AA98 on rock).
  hochstetteri (J&W98 on limestone buttresses of Palm House).
  macrostoma (AA98 on rock; **K(M)**137045 on sandstone, former rockery, 2 May 2005 BAH &AW, det. CH).
  + f. *furfuracea* (BJC70 as *V. viridula f. tectorum* s.auct. Brit., MS85).
  muralis (BJC70, MS85, AA98, J&W98 + L05 on sandstone in Rock Garden).
  nigrescens (AA98 on rock, J&W98 on concrete and rock, **K(M)**128435 on rock, 16 July 2004, T. Kokobun, det. BAH; **K(M)**137050 on sandstone, former rockery, 2 May 2005, BAH&AW, det. CH).
  viridula (J&W98 on limestone and on Queen's Beasts, L05 on rock).

Xanthoparmelia
  mougeotii (L05 on granite).

Xanthoria
  calcicola (J&W98 on brick and by The Pond). Usually in well-exposed situations.
  candelaria (J&W98 on *Fraxinus*).
  parietina (MS85, H&M89, AA98 on *Fraxinus*, J&W98 on *Aesculus* + *Fraxinus*, also on benches, brick and by The Pond, J&W04 on e.g. *Acer, Zelkova*, L05). More common as nitrogen levels increase.
  polycarpa (H&M89 on Thames bank at Kew; AA98 on *Fraxinus*; J&W98 also on benches; J&W04 on e.g. *Acer, Zelkova*, L05 on *Fraxinus.*; **K(M)**162573 on fallen twig, AW09).

Xylographa
  vitiligo (J&K98). Only London record.

Discussion

The variety of habitats is one of the reasons for the large number of recorded taxa. The species of tree are particularly diverse but there are broader factors that affect the lichen flora, for example whether the bark is basic or acid, and whether it is young and smooth or old and creviced. The slope of the tree and branches can also affect the flora. The conditions and available resources that can limit the survival of a species include temperature, light, humidity, nutrients and competition with other species. Trying to understand these factors is one reason for recording. More corticolous lichens have been recorded than saxicolous, but some species fall into both categories. *Leptogium turgidum* is the only terricolous lichen recorded in Kew in the last fifty years, no *Peltigera* and no terricolous *Cladonia* species.

The range of saxicolous species present on any given substrate will depend in part on its pH. This can be difficult to estimate as there are, for instance, calcareous sandstones. Dampness is another factor. Brick is a man-made saxicolous habitat and can have species in common with natural substrates; *Trapelia coarctata* is common on both. Paving stones can be natural or concrete, *Caloplaca crenulatella* has been found to be common on concrete. The concrete surround of the pond by the Jodrell Laboratory, where many species have been recorded, may have been affected by the management of the ponds, for example blanketweed has been left draped over the edge for some time to the detriment of the lichens. The difficulty of identifying without collecting is greater on saxicolous substrates.

Corticolous lichens are more frequently recorded than saxicolous. Trunks and twigs have usually taken precedence in recording corticolous species but in London branches are often the most abundantly covered. The return of foliose and fruticose species has been widely reported but the increase in the nitrophiles is even more striking. *Physcia* and *Xanthoria* are now the dominant corticolous genera. The increase in abundance of other foliose species in the London area has been quite marked, e.g. *Flavoparmelia soredians, Punctelia jeckeri, Hypotrachyna revoluta, Parmotrema perlatum* and even *Parmelina tiliacea*, which has yet to be found at Kew.

The commonest lignicolous habitat in the gardens is benches. The following common foliose species reported above on other substrates have also been observed on benches: *Evernia prunastri, Flavoparmelia caperata, F. soredians, Hypogymnia physodes, M. subaurifera, Parmelia sulcata, Phaeophyscia orbicularis, Physcia adscendens, P. tenella,* and *Punctelia subrudecta. Cyphelium notarisii* is a noteworthy species that has declined due to bench scrubbing.

Lichenicolous fungi have as yet been little recorded in Kew Gardens. *Athelia arachnoidea* and *Marchandiomyces corallinus* have been recorded for some time on the thalli of *Lecanora conizaeoides* but these species are in decline due to the decline of their host. *Lichenoconium lecanorae* on *Parmelia sulcata* and *L. xanthoriae* on *Xanthoria polycarpa* apothecia were only added by David Hawksworth on the occasion of the BLS visit in 2005, the latter found by C. Hitch. *Xanthoriicola physciae* on *Xanthoria parietina* apothecia was first recorded by John David in 1990 and further records were made by Henrici on *X. polycarpa* in 2009; this is a hyphomycete that seems to have become much more common in recent years, starting in the apothecia but then blackening the host.

A more thorough and systematic survey of Kew Gardens would be useful to provide a baseline against which future changes could be monitored. The dominance of *Lecanora conizaeoides* drew attention when acid rain was a problem. It was not until the *Xanthorion* was well established that it was realized that excess nitrogen is now a major cause of concern. Usually the current situation is what concerns people because we do not know what to monitor for in the future. It is hoped that recording will continue at Kew, and thus more additions will be made to the list.

Recorder's note

Note that *Caloplaca acris, C. cerinella, C. dichroa* (recorded from St Anne's churchyard, Kew Green so not included in the above list), *Lecanora aitema, L. semipallida (L. flotoviana, L. xanthostoma)* and *Opegrapha rupestris* are new to the LNHS checklist (Waterfield 2007) which also does not record the following species for square 17: *Anisomeridium biforme, Arthonia punctiformis, Caloplaca* *flavovirescens, Cladonia macilenta, Cresporhaphis wienkampii, Cyrtidula quercus, Dimerella pineti, Hyperphyscia adglutinata, Lecanora albella, L. conferta, L. hagenii, Melanelixia fuliginosa ssp. fuliginosa, Rinodina sophodes, R. teichophila, Usnea cornuta* and *Verrucaria baldensis.* The statement in Waterfield (2005) that over 180 species had been recorded at Kew should have read that over 180 names had been applied to lichens recorded at Kew. The record for *Punctelia reddenda* at Kew (Waterfield 2007) is not valid and should be deleted as this species has not been recorded in London.

Two name changes introduced in Smith et al. (2009) have been incorporated in the above list: *Punctelia ulophylla* has an earlier name *P. jeckeri* and *Rinodina gennarii* is reduced to a synonym of *R. oleae*. Other changes affecting London lichens are: *Neofuscelia* is now subsumed under *Xanthoparmelia*; the three London *Catapyrenium* are now *Placidium*; *Macentina stigonemoides* is now *Psoroglaena*; *Pyrenocollema monense* is now *Collemopsidium*; *Lichenomphalia ericetorum* is now *L. umbellifera*; and *Ochrolechia inversa* is now *Lecanora alboflavida*.

Acknowledgements

Dr Begoña Aguirre-Hudson (Kew) for information on herbarium and field records; Dr Andre Aptroot for comments on the list; Dr Brian Coppins and Jack Laundon for taxonomic information; Dr Chris Hitch for records; Professor Mark Seaward for records; Charles Shine for information on Kew rocks; Dr Brian Spooner, Head of Mycology at Kew, for use of facilities; and Dr Holger Thüs (NHM) for redetermining the *Diploschistes*.

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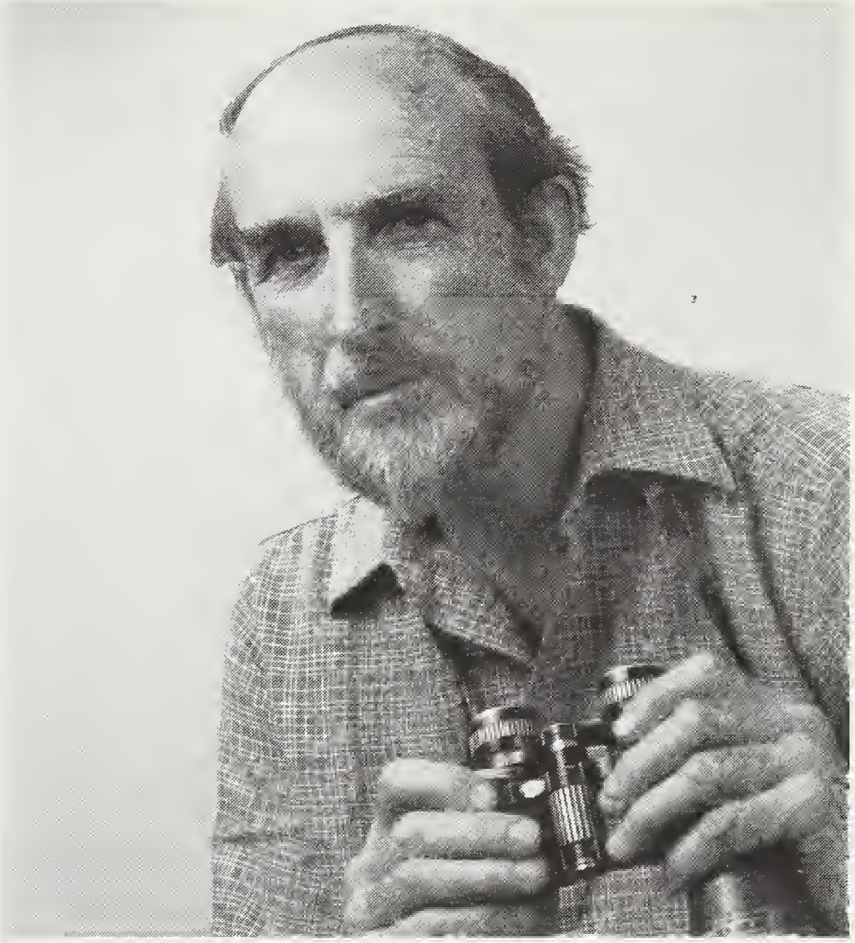
Obituary



BUNNY TEAGLE, 1920–2008

With the death of Bunny Teagle on 11 September 2008 the London Natural History Society had undoubtedly lost one of its greatest all-round naturalists.

Wilfred George Teagle was born in London on 8 May 1920. Teagle is a Cornish name and although his father had Cornish relatives, only his mother came from Cornwall. 'Bunny' is derived from the *Daily Mail* cartoon strip started in 1919, 'Pip, Squeak and Wilfred', a dog, a penguin and a rabbit, and that is the name he was accorded universally. After leaving Willesden Grammar School, Bunny entered the Civil Service, joining the staff of the Ancient Monuments Laboratory, part of the then Ministry of Works, at Lambeth Bridge House. He next worked for The Royal Parks, producing a report on the pollution problems of The Serpentine in Hyde Park. During the 1940s, he became secretary of the Committee on Bird Sanctuaries in The Royal Parks, under its chairman Lord Hurcomb. The majority of the observers who reported to the Committee were LNHS members.

Thus, when Bunny joined the LNHS in 1945 he was already well known and he soon became immersed in our activities, being deeply involved in recording birds, mammals, reptiles and amphibians. He was also no mean botanist, and all those who knew him will never forget his warm-hearted kindness, politeness, and genuine concern for others. His enthusiasm was infectious and he was greatly respected. As well as his primary passion for natural history, Bunny was interested in music, languages, literature, history and archaeology.

Within the LNHS, Bunny was perhaps most conspicuous for his milestone accounts of London's mammals, particularly foxes and badgers, for being the first chairman of our newly formed Young Naturalists Section in 1960, and for the chapter on Inner London, written jointly with Stanley Cramp, for the Society's book *The Birds of the London Area since 1900* (Collins, 1957). Like Stanley Cramp, and others, Bunny was an authority on the birds of Inner London. He also contributed to the systematic species accounts.

In 1955 he married Rosemary (now Parslow), and although the marriage was short-lived, he followed her later career in nature conservation with interest. During the last decade of Bunny's life they became frequent correspondents.

In 1957 Bunny left the Civil Service to become a mature student at Goldsmith's College to acquire a teaching diploma. He did well, becoming top of his year in 1959, but only taught for a short while in 1961. Also in the late 1950s, Bunny ran a WEA course on birds at Morley College. This proved very popular and he was always assured a large and enthusiastic turnout, whether in the class or in the field.

In 1963 Bunny married Joyce Hampton, whom he had met when she was managing the children's zoos at Crystal Palace and Battersea Park. Two days after their wedding, they moved to Dorset where Bunny took up his duties for the Nature Conservancy on 1 April as first warden of Studland Heath National Nature Reserve, following the recommendation of Max Nicholson, then director general of the Nature Conservancy. As it happened, the Studland sand dunes were also a favourite habitat for local nudists, and Bunny complained bitterly that their activities disrupted the natural succession processes in the dune vegetation. These issues were described in graphic detail in the Conservancy's office, and Bunny was asked to tone down his reports. Nothing much was actually done, so Bunny took to gathering sacks of dead gorse and scattering it in the dunes to make the sand a less-comfortable place for unclad activities! Eventually a truce was reached, where the nudists were left alone provided they stayed north of the Reserve's boundary track.

Bunny left the Nature Conservancy in November 1969 to take up a post with the Sussex Wildlife Trust at their Woods Mills headquarters. However, he didn't settle there and in the spring of 1970 he and Joyce returned to Swanage to the same house which had remained unsold, and there he spent the rest of his life. From then on, for several years, Bunny and Joyce worked at the nearby Leeson House Field Study Centre, helping with the nature trail, leading groups, producing educational material, and tending to parts of the grounds and gardens.

Visiting Bunny at home was always a lively experience. At the mention of some species or principle, he would slap on his glasses, leap up and scrabble energetically in some heavily thumbed reference book, then with a loud exclamation of triumph would verify an identification or point of information. His books were very definitely for usé, not ornament, even his complete run of New Naturalists. He had an encyclopaedic knowledge of the British flora and fauna, which was very humbling, and yet he was always in awe of 'experts' whom he thought were superior to himself. There was also the less scientific aspect of a visit to Bunny and Joyce's house. If there was classical music on the radio, Bunny was just as likely to jump up, grab a ruler, pencil or spoon, and animatedly conduct the invisible orchestra, whilst his small audience had to be prepared to duck when necessary. Equally lightheartedly, Bunny and his visitors would converse quite happily in Goon Show character voices!

In 1975, Bunny was commissioned by the Nature Conservancy Council to make a rapid survey of the wildlife habitats in the Black Country to provide basic data for a then new West Midlands Counties Structure Plan. Anyone knowing how painstaking and thorough Bunny was with any work he undertook, paying great attention to detail, will not be surprised that the end result was both important and valuable. For the first time, it demonstrated the wealth of wildlife that existed in the West Midlands and identified many important sites, even in the industrial areas. Three years later the NCC published Bunny's report in the form of *The Endless Village* (1978) for which he received much publicity and acclaim. It led to an upsurge of interest in the wildlife of urban areas and its conservation and saw the beginning of a

Ruffs and lapwings near Wareham. A Bunny Teagle Christmas card, 2005

programme of habitat conservation by the Nature Conservancy Council. In due course the Urban Habitat Network was created and urban ecology as a subject came into its own. Bunny's survey resulted in the establishment of a number of important nature reserves in the area. Although now over thirty years have passed since *The Endless Village* appeared, it has acquired classic status and is regularly cited by ecologists and other field workers.

In the 1950s Bunny had started making a film on London's wildlife. He had written a partial script and every scene was meticulously documented, including starlings amongst the temporary ranks of seating being erected in Trafalgar Square for the Queen's coronation in 1953. The film was never finished because there was always something new that should be added or it would not be complete. The film is now in the archive of the British Library together with some sound recordings.

Bunny deserved to be much better known than he was although he never saw himself as a high-flyer. In the best tradition of the British amateur naturalist, his studies were to influence the professional work of others who succeeded him. He gave much encouragement to a number of younger people who went on to become professional naturalists and conservationists. His great sense of humour and his infectious, almost childlike, enthusiasm for his subject made him an enjoyable companion in the field and a great friend and teacher.

A nice touch was that every year close friends would receive from Bunny and Joyce a charming Indian ink Christmas card showing a bird or birds of Bunny's choice.

Bunny's marriage to Joyce was long and happy and they devotedly supported each other throughout their forty-five years together and during which period they both had serious health problems.

To be with Bunny for any length of time was to be subjected to a kaleidoscope of experiences: in his company you were enthused, entertained, educated, and sometimes exasperated, but never, never, bored!

My thanks to Joyce, and to John F. Burton, Rees Cox, Pat Morris, Rosemary Parslow and Peter Tinning for contributing their memories to this tribute.

Bunny, we miss you.

KEITH H. HYATT

Book review

A spring without bees. How colony collapse disorder has endangered our food supply. Michael Shacker. The Lyons Press, Guilford, Connecticut. 2008. 292 pp. Hardback, £14.99. ISBN 978 1 59921 432 0.

This book describes the recent widely experienced phenomenon of the sudden collapse of the numbers of worker bees in commercial hives of *Apis mellifera* both in Europe and in the USA. The observed effects, as I read this account, are quite different on the two continents, hence the ongoing dispute as to the causes and dithering as to how to identify and ameliorate them.

The effect in Europe is said to be one of the disappearance of a large proportion of bees within days of their hives being put out to pollinate crops in June and July. The bees do not return to their hives, so the larvae in the hive starve and the colony dies out or is so reduced as to be of no further utility. The circumstances were first investigated by French beekeepers in relation to pollination of sunflower crops. Some pollutant or poison killing bees or disrupting their behaviour in the field was suspected and farmers were questioned about any change in their methods of managing the crop. It transpired that a new neurotoxin insecticide category, the chlorinated nicotine derivatives, had been introduced and used either as sprays or as seed dressings to suppress attack by soil pests. As these insecticides work by inhibiting the transmission of nerve signals across synapses, the possibility of behavioural disruption at sublethal doses below 12 ppb in syrup was demonstrated by researchers at the Institut National de la Recherche Agronomique. French beekeepers successfully campaigned for the new insecticides to be banned from use on flowering sunflower crops. At the time of publication of this book relief was claimed for bees in southwest France, but I am informed that in 2009 this has not been repeated. The manufacturers of Imidacloprid (IMD) sell many formulations of this insecticide. One for termites claims inhibition of feeding behaviour.

In the USA, hives are transported to many states to pollinate crops at various seasons and different bee subspecies peaking their pollen collecting activities at appropriate months are used. The almond crop flowering in California in February has hosted one of the worst examples of colony collapse disorder. Commercial suppliers of hives to pollinate crops have had some success in reducing their losses by refusing to supply to users of IMD on flowering crops. The cases detailed by the author are not however of immediate colony collapse, but of subsequent autumnal losses. A possible reason put forward is that the bees have stored polluted honey and are killed by it when they use it as winter feed. As one would have expected that honey to have been extracted for sale, this does not sound too plausible.

It had been assumed by funders of honeybee research that there was no case for further expenditure, at least until the *Varroa* mite struck Europe and America. Bumblebees are now the *cause célèbre*. This factor, exacerbated in the USA according to the author by the increasing replacement of government funding of academic agricultural research by interested commercial company funding, plus the conflicting nature of beekeepers' experiences, has, it is claimed, led to delay and often misdirected research into the phenomenon of honeybee colony collapse.

The latter half of this provocative book includes references to reports cited in the text, ways of pressing for appropriate research, advocacy for organic farming and a list of addresses of US suppliers and relevant bodies.

RAYMOND UFFEN

Obituary

SIR CHARLES WILLINK, 1929–2009

The news of the death of Sir Charles Willink on 10 March 2009 was received with great sadness by all those concerned with the well-being of Hampstead Heath.

Distinguished scholar, classicist, and a schoolmaster by profession, Charles was also a very good amateur botanist, an interest pursued by many other notable classicists through the ages. A King's Scholar at Eton, Charles was a contemporary and close friend of Douglas Hurd, later Foreign Secretary. Hurd wrote of him in his memoirs that 'In a carefree manner, without any exceptional study, he swept the board in every classical examination continuously through his five years in College. He was not ambitious in other spheres, never boasted nor sought fame, was always good tempered.' After reading Classics at Trinity College, Cambridge, he taught at Marlborough and then returned to Eton where he remained for thirty-one years as Classics master and later as a housemaster. He once remarked that he learnt his botany on the playing fields of Eton, but failed to continue to tell us if it was as a boy or when he returned as a master. He never mentioned that he was recognized as a world expert in the study of Greek tragedy and metre. Amongst his several publications, his edition of Euripides's *Orestes*, published by Oxford University Press, became a standard. He was one of the visionaries who in 1975 were involved in a famous project to reconstruct a Greek trireme. When finished it was rowed up the Thames and moored outside the Houses of Parliament, where it was inspected by thousands.

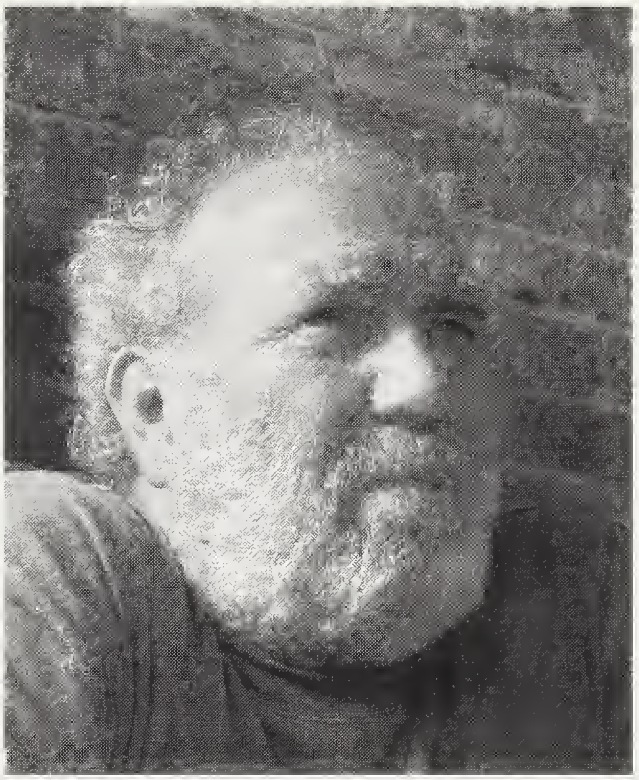
In 2000 he joined the London Natural History Society's Hampstead Heath Survey, which had been set up in 1996. The intention was to produce a floral survey which would supplement the rather incomplete one published in 1986 by the GLC. Charles and his dog were welcomed with pleasure by the group and he became the lead member with the responsibility of checking that all areas of the Heath were recorded. The speed of recording increased enormously as the dog had to be walked every day, and Charles meticulously recorded all the odd areas difficult to access or missed by shortage of time on the weekly meetings. The records from 2001 to 2003 were entered into an Access database. This took rather longer than Jennifer Devos had anticipated as Charles's botanical records were stored using a word processing program on his computer which was specially adapted for ancient Greek, and Dave Corcoran had to go through a very complicated procedure to transfer these records to the Access database. A CD was finally published in 2008 and recording still continues.

Charles agreed to join the Heath Sub-Committee of the Heath and Hampstead Society in 2005 and was a well-respected and active member of the committee, always willing to share his vast knowledge of the Heath flora for the benefit of the Society. In the last few years he was one of a small group of H&HS committee members (also LNHS members) invited to assist the City of London ecologist to walk the Heath with a GPS to record accurately the flora of importance to the ecology of the Heath.

Charles married in 1954 the artist Elizabeth Andrewes, and during his retirement they led trips to the Mediterranean area searching for wild flowers. Our photograph shows Charles relaxing on one such trip. 'There were blue gentians at his feet', his wife recalled. It was some weeks later that we heard that Elizabeth had died, and our sympathy at this difficult time goes out to their two children, Edward, who succeeds to the baronetcy, and Penny, their daughter.

SHEILA AYRES

Obituary



CYRIL ALEXANDER WALKER, 1939–2009

Cyril Walker joined the London Natural History Society in 1956 and was immediately involved in the Ornithology Section where he soon became a reliable and respected fieldworker. He was also actively involved in the St Agnes Bird Observatory on the Isles of Scilly which had been founded jointly by members of the LNHS and the British Trust for Ornithology. On one memorable occasion, 7 November 1959, Cyril arrived on St Agnes when the sea all around was dead calm, the cloud was low, and the horizon was barely discernible in the poor light, and there were rafts of grey phalaropes on the water around the islands. However, before he was due to leave Scilly, gales had set in and he had an enforced stay of an extra ten days!

In 1961 and 1963, two small parties of mainly LNHS and Natural History Museum members journeyed by minibus to southern Spain to spend time at the Coto Doñana among the birds and other wildlife so graphically described by Guy Mountfort in his *Portrait of a Wilderness* (1958). Whilst we were driving down through orange groves in April 1963, Cyril let out an almighty yell — ‘Stop! Masked shrike!’. We screeched to halt as the bird flew across the road in front of us. We just had time to confirm its distinguishing features before it dropped through the trees. When we described the sighting to Tono Valverde, the ornithologist at Almeria, he was neither impressed nor convinced — prove it, he said. We hadn’t shot it! It was only the third record for Spain.

Cyril was also much involved in bird ringing at locations including Barn Elms, St Agnes in the 1950s and ’60s, Cap Gris Nez and Morocco. In the late 1950s, Cyril commenced ringing in North Kent in partnership with Don Glanville, a colleague from the Natural History Museum and also an LNHS member. This rapidly developed into the North Kent Ringing Group. Its operations centred at first in a disused quarry on the Hoo peninsula, but soon extended to other areas on the peninsula, including a freshwater lagoon where roosting waders could be caught at night. By 1963, the lure of wader trapping took the group to Sheppey, where, in conjuction with the Mid-Kent Ringing Group, the Swale Wader Group was formed and is still active. Cyril played a leading role in the development of both groups and was skilful in identifying sites where large numbers of birds could be ringed. On one memorable day in November 1963, 184 birds were ringed at High Halstow, and that night no fewer than 235 waders were caught on Sheppey — a total of over 400 birds ringed in under twenty-four hours, and all caught by mist net. The members of the group in those days were not just keen, but fit, and that applied in full measure to Cyril.

Cyril Walker was born in west London on 8 February 1939, the son of a greengrocer. He was educated at St Benedict's School, Ealing, and at Acton Technical College where he took A-levels in zoology and botany. On 1 May 1958, he joined the staff of the British Museum (Natural History) as a Scientific Assistant, but after a brief spell in the Fossil Plants Section he was, like other young men at the time, called-up for two years of National Service, in his case in the Royal Army Education Corps.

In 1960 Cyril returned to the Museum and spent a year in the Palaeontology Library before moving to the Fossil Amphibians, Reptiles and Birds Section where he progressed through a series of promotions to Senior Scientific Officer in 1985. Cyril's career was a combination of curation and research; he developed an interest in fossil turtles but his particular expertise lay in fossil birds, backed up by his considerable renown as an enthusiastic birdwatcher with a worldwide life list. He enjoyed a productive research collaboration with the late Colin Harrison, who worked in the Sub-department of Ornithology at Tring, and together they published a series of papers through the 1970s on Mesozoic and Cenozoic birds, notably the rich avifauna from the Lower Eocene of the Isle of Sheppey, Kent. Between 1969 and 1971, Cyril contributed twenty-seven species accounts (including masked shrike!), and, with Colin Harrison, four articles on fossil birds, to the part-work nine-volume series *Birds of the World*. Also with Harrison, Cyril published a short paper in *The London Naturalist* (**56**, 1977) on fossil birds in the London Basin. Cyril's most outstanding work was the recognition of a new subclass of birds, Enantiornithes, based on material from the latest Cretaceous in Argentina, which he published in *Nature* in 1981. This sealed his reputation as a leading palaeornithologist and he was gratified to see the growing discoveries and literature on enantiornithines, now much better understood as the dominant group of Cretaceous birds.

However, Cyril's post as Curator of Fossil Birds in the Palaeontology Department was discontinued after a staff reorganization in 1990. Over the next five years he took on the task of planning and coordinating the move from one of the Museum's outstations at Ruislip to another at Wandsworth while spending one day a week on fossil bird curation and research. His final post was in the Bird Section at Tring from 1996 until he retired in February 1999. In retirement, he continued his bird research on a collaborative basis until 2008 when his health began to fail.

There is no doubt that Cyril was at his best when in the field, and he travelled widely. He was joint leader of a number of trans-Saharan expeditions, and he participated in expeditions to Niger where they collected material from the largest group of dinosaurs, the sauropods, and to Queensland where the team discovered the earliest-known herring from the Cretaceous period.

Cyril was a big personality, a fine and generous colleague, a fount of knowledge about the collections and Museum personalities, great company and a brilliant field cook.

A special symposium on Mesozoic birds was held in Cyril's honour during the Society of Vertebrate Palaeontology's first European meeting at the University of Bristol in September 2009. Cyril knew of these plans and felt very honoured. But it was not to be. He died on 6 May 2009, aged seventy.

Cyril Walker is survived by his wife Judy Greenwood and three stepchildren, and by his son Mark from his marriage to Bridget (née Goodings).

My special thanks to Dr Angela Milner, Associate Keeper of Palaeontology at the Natural History Museum, for kindly allowing me to quote from her internal tribute to Cyril. My thanks also to Tony Hutson for details of some of Cyril's overseas travels, and to Peter Oliver for outlining Cyril's involvement in the North Kent Ringing Group.

Keith H. Hyatt

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The London Naturalist

Instructions to contributors

Submission of papers

Papers **must be submitted in duplicate** to the editor, Mr K. H. Hyatt at his home address, 1 Tremcelynog, Rhandirmwyn, Llandovery, Carmarthenshire SA20 0NU. Please contact the editor before the end of January if you wish to contribute to the forthcoming issue. However, the editor may be contacted at any time on 01550 760346 to discuss possible contributions, and will be pleased to send a recent offprint to show our style, and as a guide to preparing the manuscript, **which should be followed as closely as possible in regard to layout and typefaces.** Manuscripts **must be double spaced throughout on one side of the paper only** and with wide (3-cm) margins. **Authors must retain a copy.** Papers should include at the beginning an **abstract, summary** or **synopsis. Sheets must be numbered.** Papers are peer-reviewed as appropriate. **After acceptance**, the editor would be pleased to receive contributions as Microsoft Word-compatible files (or they can be e-mailed to the printer) **together with two matching hard copies of the final text.** Papers should be relevant to the natural history and archaeology of the London Area. This includes comparisons between London and its surrounding countryside with other localities, as well as work relating to or comparing species or habitats which occur in the London Area. Contributions of relevance nationally will also be considered.

Text

Locality spellings should follow the latest editions of maps published by the Ordnance Survey. Capitalization should be kept to a minimum. Common names of animals and plants must begin with lower-case initials (except for proper nouns), and **only** Latin names of genera and species must be underlined unless typed in italic. When both common and Latin names are given there should be no brackets or commas separating them. **Genus names should appear in full where first used within each paragraph.** When scientific names are taken from a standard work, which must be cited, authorities may be omitted. In descriptive matter numbers up to a hundred should be in words, except in a strictly numerical context. Dates should follow the logical sequence of day, month, year, i.e., 25 December 1971, but in lists may be as 25.xii.1971. Measurements should be in metric and follow the SI system (Système International d'Unités), with imperial equivalents in parentheses where appropriate. There should be no full point following Dr, Mr, Mrs, or St. Lists should be in systematic, alphabetic or numerical order. **Hyphens should not appear at the ends of lines** as the right-hand margins of manuscripts do not need to be justified: **turn off the hyphenation option. Tables and figure legends should be typed on separate sheets at the end of the text. Word-processed text should not use italic, bold or compressed typeface. Paragraphs should be indented. Sentences must not begin with numerals. Footnotes should be avoided.**

References

Reference citation should follow the examples given below. Capitalization in titles of books and papers in journals should be kept to a minimum. Journal titles should be in full, or follow the abbreviations in the *World list of scientific periodicals,* and be underlined or in italics. Book titles should also be underlined or in italics. Examples are as follows:

In text:

Meadows (1970: 80) or (Meadows 1970).

In references:

MEADOWS, B. S. 1970. Observations on the return of fishes to a polluted tributary of the River Thames 1964–9. *Lond. Nat.* **49:** 76–81.

MELLANBY, K. 1970. *Pesticides and pollution.* Ed.2. Collins, London.

WHITE, K. G. 1959. Dimsdale Hall moat, part II. *Trans. a. Rep. N. Staffs. Fld Club* **92:** 39–45.

Authors must ensure that all references are cited accurately: they will not be checked by the editor.

Illustrations

Distribution maps should be submitted in the form of a recording map with symbols in Indian ink and stencilled or by transfers. Solid dots are used to indicate contemporary or recent presence, circles for old records, and crosses (not pluses) for other information, such as introduced species. The caption should be written outside the frame of the map and will be set up by the printer. Scale bars must be included **within** the frame of the map.

Line drawings should be in Indian ink on white card or tracing paper, larger than the printed size, but no larger than A4. Place names, etc., must be produced with stencils or with sharp typing. Captions should be separate as they will be set up by the printer, but keys that include special characters should be included **within** the border of the figure.

Photographs should be glossy black-and-white prints, of good contrast, preferably plate or half-plate in size, or, following consultation with the editor, in the form of colour transparencies, either 35 mm or larger. Colour prints are also suitable for reproduction in the text in black and white.

Computer-generated illustrations must be sharply defined and preferably be supplied digitally.

Proofs

Proofs will be sent to authors for scrutiny, but only essential corrections can be made at that stage.

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